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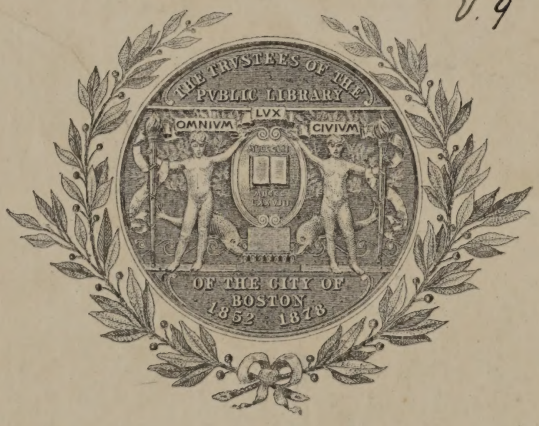
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THE

IDEAS

THAT HAVE INFLUENCED

ORIGINAL DOCUMENT IN THE
DEPARTMENT OF HISTORY, UNIVERSITY OF CHICAGO

TEN VOLUMES

VOL. IX

1833-1860

BOSTON CHICAGO

THE ROBERTS-MANCHESTER PUBLISHING CO.
MILWAUKEE

HELIDORE CLEANSING THE TEMPLE

By Delacroix, 1798-1863.

FERDINAND VICTOR EUGENE DELACROIX was born at Charenton-Saint-Maurice, near Paris, April 26, 1798. The family affairs were conducted in the wildest manner, and the accidents that befell the child make it almost a miracle that he survived. He was first nearly burned to death in the cradle by a nurse falling asleep over a novel and dropping a candle on the coverlet; he was next dropped into the sea by another *bonne*, who was climbing up a ship's side to see her lover. He was nearly poisoned, nearly choked, and to crown all, he tried to hang himself without any thought of suicide in imitation of a print exhibiting a man in that position. His father was a partisan of the most violent faction during the Revolution. He died at Bordeaux when Eugene was seven years of age and his mother returned to Paris and placed him in the Lycée Napoleon. He was determined to be a painter and at the age of eighteen entered the Academy of Art, then presided over by Baron Guérin, but from the first he rebelled against the classic tastes of his teacher. Delacroix exhibited his first picture, "Dante and Virgil making their passage round the Infernal City," at the Salon in 1822. His master told him it was absurd, detestable and exaggerated. It was a bold departure from the cold correctness of manner then in vogue; but from this time on, although Delacroix had to bear much rough criticism, his position was assured. He was an ardent admirer of both Rubens and Constable. He painted the walls of the Salon du Roi, at the Palais Burbon. Delacroix was engaged on this work from 1834-37. These paintings are regarded as very fine examples of the artist's more elevated style. He also adorned the library of the same place. The admiration excited by these works led to his being called upon to paint portions of the interior of various other public buildings in Paris. Delacroix never visited Italy; he refused to go on principle, lest the old masters, either in spirit or manner, should impair his originality and self-dependence. He had the greatest admiration for Byron and Shakespeare in poetry, and the classic subjects had their turn on the easel. He continued his work indefatigably, having his pictures seldom favorably received at the Salon. He died Aug. 13, 1863.

THE

IDEAS

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ORIGINAL DOCUMENTS

OLIVER J. THATCHER, PH. D.

DEPARTMENT OF HISTORY, UNIVERSITY OF CHICAGO

AUTHOR OF "EUROPE IN THE MIDDLE AGE" (WITH F. SCHWILL), "A SHORT HISTORY OF MEDIAEVAL EUROPE," "A GENERAL HISTORY OF EUROPE" (WITH F. SCHWILL), "A SKETCH OF THE HISTORY OF THE APOSTOLIC CHURCH."

EDITOR

TEN VOLUMES

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THE ROBERTS-MANCHESTER PUBLISHING CO.

MILWAUKEE

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ALTHOUGH THE EDITOR only is responsible for the matter included in this set of books, yet he has been greatly assisted by the suggestions he has received from specialists in their own fields. As the editing of the last volumes is not yet finished, it is impossible to give full credit for such advice, but the editor takes this opportunity to acknowledge the important counsel or additional suggestions received from:

A. H. SAYCE, LL. D., D. D.,
PROFESSOR OF ASSYRIOLOGY, QUEEN'S COLLEGE, OXFORD UNIVERSITY.

CRAWFORD H. TOY, A. M., LL. D.,
PROFESSOR OF ORIENTAL LANGUAGES, HARVARD UNIVERSITY.

WALTER MILLER, A. M.,
PROFESSOR OF CLASSICAL PHILOLOGY,
THE LELAND STANFORD JUNIOR UNIVERSITY

HENRY RUSHTON FAIRCLOUGH, PH. D.,
PROFESSOR OF CLASSICAL LITERATURE,
THE LELAND STANFORD JUNIOR UNIVERSITY.

FRANK FROST ABBOTT, PH. D.,
PROFESSOR OF LATIN, UNIVERSITY OF CHICAGO.

JOHN CAREW ROLFE, PH. D.,
PROFESSOR OF LATIN, UNIVERSITY OF MICHIGAN.

DANA C. MONRO, A. M.,
DEPARTMENT OF HISTORY, UNIVERSITY OF PENNSYLVANIA.

EDWARD G. BOURNE, PH. D.,
PROFESSOR OF HISTORY, YALE UNIVERSITY.

FERDINAND SCHWILL, PH. D.,
DEPARTMENT OF MODERN HISTORY, UNIVERSITY OF CHICAGO.

HARRY BURNS HUTCHINS, LL. D.,
DEAN OF THE DEPARTMENT OF LAW, UNIVERSITY OF MICHIGAN.

WILLIAM H. WELCH, M. D., LL. D.,
DEAN OF THE MEDICAL FACULTY, JOHNS HOPKINS UNIVERSITY.

THEODORE WILLIAM RICHARDS, PH. D.,
DEPARTMENT OF CHEMISTRY, HARVARD UNIVERSITY.

PAUL REINSCH, PH. D.,
DEPARTMENT OF POLITICAL SCIENCE, UNIVERSITY OF WISCONSIN.

H. H. MANCHESTER, A. B.,
MANAGING EDITOR FOR THE ROBERTS-MANCHESTER PUBLISHING CO

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PHYSICS

(1800-1833)

CONTINUED FROM VOL. VIII.

OERSTED

HANS CHRISTIAN OERSTED was born in the Danish island of Langeland, August 14, 1777. His father was an apothecary. He learned from an old school book. Both brothers entered the University of Copenhagen in 1794, and Hans took his doctor's degree in 1799. After traveling for three years he became an exceedingly popular lecturer at his university in 1806.

He made his great discovery of the identity of electricity and magnetism in 1820. This led to the discoveries by Henry and Faraday of a method of changing the one into the other, and eventually made practicable the electric dynamo and motor and all that they imply.

He was not only a physicist, but a philosopher and poet. Behind Nature he saw Mind, and his "Soul in Nature" is an argument that the laws of nature—of things in themselves—are *mental* laws. If one will stop to consider the vast import of this proposition he will see that if it can be reasonably proved, it will compel belief in a God, and put religion on a sure ground. Oersted, of course, did not *prove* this, but he did much to explain how it might be true. He reinforced Plato's doctrine of Ideas with all the scientific knowledge of the time to illustrate how the *laws* of nature are the *thoughts* of nature. "The material and the spir-

THE MILL

By Turner, 1775-1851.

JOSEPH MALLORD WILLIAM TURNER was born in London, April 23, 1775. His father kept a barber and hairdressing shop. His education was very limited, in fact he never even mastered his own language or learned that of any other country. His earliest known drawing, a view of Margate Church, dates from his ninth year: at thirteen he had given up school and settled on a career as an artist. From 1788-1789 he was studying perspective with Malton, architectural drawing with Girtin and drawing from nature in pencil and water color. In 1789 he became a student at the Royal Academy. He also worked for a time with Sir Joshua Reynolds, and in 1790 Turner's name appears for the first time in the catalogue of the Royal Academy. He was elected a Royal Academician in 1802 and soon afterwards traveled in France, Italy, and Switzerland.

He taught perspective in the Royal Academy; had a most successful artistic career, and received many honors. As a landscape colorist he ranked very high. He died Dec. 19, 1851.

PHYSICS
(1800-1833)

CONTINUED FROM VOL. VIII.

OERSTED

HANS CHRISTIAN OERSTED was born in the Danish island of Langeland, August 14, 1777. His father was an apothecary. He learned German from a neighbor and taught himself and his brother arithmetic from an old school book. Both brothers entered the University of Copenhagen in 1794, and Hans took his doctor's degree in 1799. After traveling for three years he became an exceedingly popular lecturer at his university in 1806.

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itual are inseparably united in the living Idea of the Almighty Power by whom all things are created."

Oersted died March 9, 1851.

EXPERIMENTS AS TO THE EFFECT OF THE ELECTRICAL CONFLICT ON THE MAGNETIC NEEDLE

The first experiments concerning the subject which I am undertaking to elucidate, were carried out in the lectures which I gave last winter on electricity, galvanism and magnetism. From these experiments it seemed to appear that the magnetic needle could be moved from its position by means of the galvanic apparatus, and that with a closed galvanic circuit, and not with an open one, as certain noted physicists in vain attempted several years ago. As these experiments, however, were made with rather weak apparatus, and on that account the manifestations obtained seemed hardly commensurate with the importance of the subject, I called my friend Esmarch to my aid in order to repeat and multiply the experiments with him by means of a large galvanic apparatus which we constructed together.

In the account of our experiments I pass over all such as, though they led to the discovery, really added nothing to the explanation of the matter when once it was discovered, and confine myself to those from which the nature of the subject plainly appears.

The galvanic apparatus of which we made use consists of 20 rectangular copper cells, each 12 inches long by 12 deep, and $2\frac{1}{2}$ inches wide, and each provided with two strips of copper, so inclined as to support the copper bar which holds the zinc plate floating in the fluid of the adjoining cell. The water with which the cells were filled was mixed with 1-60 of its weight of sulphuric acid and an equal amount of nitric acid; the immersed part of the zinc plate in each cell was 10 inches square. Smaller apparatus than this may be used, provided it is capable of bringing the wire to a glow.

Imagine the two opposite ends of the galvanic apparatus united by a metal wire. This I shall call, for brevity, the connecting conductor, or the connecting wire; but the action which takes place in and around this connecting conductor I shall designate as the electrical conflict.

(1) Bring a straight piece of this connecting wire into a horizontal position over an ordinary freely moving magnetic needle so that the two will be parallel; for this purpose the wire may be bent at will without doing any harm. When all is so arranged, the magnetic needle will begin to move, so that it turns toward the west under that part of the wire coming from the negative end (pole) of the galvanic apparatus. If the distance between the wire and the needle is not more than $1\frac{1}{4}$ inches, this deflection is about 45°. Beyond this the angle of deflection diminishes as the distance increases. It varies also according to the difference in power of the apparatus.

The connecting wire may be moved toward east or west, so long as it remains parallel to the needle, without other influence on the result, than diminishing the deflection. This action, consequently, is in no wise to be attributed to an attraction; for the same pole of the magnetic needle which turns toward the connecting wire when it is east of the needle, turns away from the same when on the west side of it. This would not be possible if these deflections were due to attraction and repulsion.

(2) The connecting conductor may consist of several wires or metal strips united. The nature of the metal will not alter the effect, unless it be in respect to its amount (Grösse). We used wires of platinum, gold, silver, brass, and iron, as well as strips of tin and lead, and quicksilver with like result. If the conductor is broken by water, this action is not entirely wanting, not even when the stretch of water is several inches long.

(3) The connecting wire acts on the magnetic needle through glass, metal, wood, water, resin, through earthen vessels (töpferne Gefässe), and through stone; for when we put a pane of glass, a sheet of metal or a board between the two it did not prevent the effect; indeed all three together seemed scarcely to weaken the influence. Just as little did an electrophorus, a slab of porphyry and an earthen vessel (irdenes Gefäss), even when the latter was full of water. Our experiments proved also that the effects mentioned were not altered by using a magnetic needle inclosed in a brass receptacle filled with water. I scarcely need to mention that the passage of these effects through all these substances has never been observed before with electricity or magnetism. The effects produced by (in) the electrical conflict are then wholly different from those of one or another electrical force.

(4) When the connecting wire is in a horizontal plane below the

magnetic needle all the specified effects move in an opposite direction to that when it is in a horizontal plane above, but otherwise in precisely similar fashion. The pole of the magnetic needle, below which is that part of the connecting wire into which the electricity came directly from the negative end of the galvanic apparatus, now turns to the east.

This may be more easily remembered by the following formula: The pole above which the negative electricity enters is deflected toward the west; the pole below which it enters, toward the east.

(5) Turning the connecting wire in a horizontal plane so that it gradually makes a larger angle with the magnetic meridian, increases the deflection of the magnetic needle if the turning of the wire be toward the locality of the disturbed needle; it diminishes, however, if the turning be backward from this locality.

(6) A connecting wire in the same horizontal plane as a magnetic needle held in equilibrium (äquilibrirt) by a counter-weight, and parallel with the needle, will not cause it to move either toward east or west, but only to vibrate in the plane of its inclination so that the pole near which the negative electrical force in the wire originates will be depressed if that is to the west of it, or elevated if it is to the east.

(7) If the connecting wire is placed perpendicular to the plane of the magnetic meridian above or below the needle, it remains at rest unless the wire is quite near the pole, in which case the pole will be raised if the current comes from the west side of the wire and depressed if it comes from the east side.

(8) If the connecting wire is placed perpendicularly near one pole of the magnetic needle and opposite it, and the upper end of the wire receives the electricity from the negative end of the galvanic apparatus, this pole moves toward the east; if, on the contrary, the wire is near some point between the pole and the centre of the needle, that will be driven toward the west. When the upper end of the wire receives the electricity from the positive end, precisely the opposite will take place.

(9) If the connecting wire be bent till both parts are parallel, or form two parallel arms, the magnetic pole will be attracted or repelled by it according to circumstances. If the wire be placed opposite one of the two poles of the needle so that the plane of the parallel arms is perpendicular to the magnetic meridian, and the eastern arm be connected with the negative, the western with the positive end of the galvanic apparatus, in this position the nearest pole will be repelled toward east or west, as the position of the plane of the two arms determines. If the eastern

arm be connected with the positive, the western with the negative end, the nearest pole will be attracted. If the plane of the arms be brought perpendicular to a point between the pole and the middle of the needle, the same manifestations will be reversed.

(10) A brass needle suspended in the same way as the magnetic needle, will not be moved by the action of the connecting wire. A needle of glass, too, or of gum-lac, will remain at rest through all such experiments.

From all this certain conclusions by way of explanation of these phenomena may be deduced. The electrical conflict is able to affect only the magnetic parts of matter. Not all magnetic bodies appear to be permeable to the electric conflict; on the contrary, magnetic bodies, or rather the magnetic portions of them, seem to resist the passage of this conflict, and therefore can be set in motion by the impact of the contending forces.

That the electrical conflict is not confined to the conducting wire, but, as already said, is diffused to some considerable distance through the surrounding space, is sufficiently shown by the observations cited.

From what has been observed we may conclude that this conflict moves in circles; for without this assumption one cannot understand how the same part of the connecting wire, which placed under one pole of the magnetic needle, drives it toward the east, should move it toward the west when placed above it; a circular motion, however, takes place in the opposite ends of a diameter in opposite directions. It appears, furthermore, that this circular movement, in connection with the forward movement lengthwise of the conductor, must describe a helicoid curve or spiral; this, however, if I mistake not, contributes nothing to the explanation of the observed phenomena.

All the effects here given, on the north pole of the needle, are easily understood, if one assumes that the negatively electrical force, or matter, follows a spiral toward the right and repels the north pole, but does not affect the south pole; and just so all effects on the south pole, if one ascribes to the positive electrical force, or matter, a movement in the opposite direction and the ability to act upon the south pole and not the north. Concerning the agreement of this law with nature, further experiments will give more convincing proof than a lengthy explanation; but judgment on the experiments would be much facilitated by diagrams showing the course of the electrical forces in the connecting wire.

I would add to what I have said above that I showed in a work

published seven years ago that heat and light are the electrical conflict. From the recent additional observations one may conclude that the motion in circles occurs also in these effects (Wirkungen); this, I believe, may contribute much to the explanation of those facts which we call the polarity of light.

Copenhagen, 21 July, 1820.

JOSEPH HENRY

JOSEPH HENRY was born December 17, 1797, at Albany, New York. He was preparing for medicine, but an appointment as assistant engineer on the State road turned his bent toward mechanics, and in 1826 he became instructor in physics at the Albany institute.

He became greatly interested in electricity and in 1828 first produced a strong electro-magnet proper by winding soft iron with fine insulated wire. He soon succeeded in exciting such electro-magnets at a distance by the use of battery of high intensity composed of many cells. He showed that the number of the coils of fine wire about a magnet have as much influence as the intensity of the current and that by winding the soft iron magnet with a great many coils it could still be made magnet, even though the current had lost most of its intensity because of the long distance it had traversed. This principle gave Morse a basis to work on in devising the telegraph. In 1832 he discovered the fact that in a long conductor the primary current, by an induction upon itself, produces a number of secondary currents that greatly increase the intensity of the discharge. These principles were all of the greatest practical importance.

In 1832 he was elected Professor of Natural Philosophy at Princeton, and in 1846 secretary of the Smithsonian Institution. He was made a member of the lighthouse board in 1852 and chairman in 1871. He died May 13, 1878.

ON THE PRODUCTION OF CURRENTS AND SPARKS OF ELECTRICITY FROM MAGNETISM

Although the discoveries of Oersted, Arago, Faraday, and others, have placed the intimate connection of electricity and magnetism in a most striking point of view, and although the theory of Ampère has referred all the phenomena of both these departments of science to the same general laws, yet until lately one thing remained to be proved by experiment, in order more fully to establish their identity; namely, the possibility of producing electrical effects from magnetism. It is well known that surprising magnetic results can readily be obtained from electricity, and at first sight it might be supposed that electrical effects could with equal facility be produced from magnetism; but such has not been found to be the case, for although the experiment has often been attempted, it has nearly as often failed.

It early occurred to me that if galvanic magnets on my plan were substituted for ordinary magnets, in researches of this kind, more success might be expected. Besides their great powers these magnets possess other properties, which render them important instruments in the hands of the experimenter; their polarity can be instantaneously reversed, and their magnetism suddenly destroyed or called into full action, according as the occasion may require. With this view, I commenced, last August, the construction of a much larger galvanic magnet than, to my knowledge, had before been attempted, and also made preparations for a series of experiments with it on a large scale, in reference to the production of electricity from magnetism. I was, however, at that time accidentally interrupted in the prosecution of these experiments, and have not been able since to resume them until within the last few weeks, and then on a much smaller scale than was at first intended. In the meantime, it has been announced in the 117th number of the *Library of Useful Knowledge,* that the result so much sought after has at length been found by Mr. Faraday of the Royal Institution. It states that he has established the general fact, that when a piece of metal is moved in any direction, in front of a magnetic pole, electrical currents are developed in the metal, which pass in a direction at right angles to its own motion, and also that the application of this principle affords a complete and satisfactory explanation of the phenomena of

magnetic rotation. No detail is given of the experiments, and it is somewhat surprising that results so interesting, and which certainly form a new era in the history of electricity and magnetism, should not have been more fully described before this time in some of the English publications; the only mention I have found of them is the following short account from the *Annals of Philosophy* for April, under the head of Proceedings of the Royal Institution:

"Feb. 17.—Mr. Faraday gave an account of the first two parts of his researches in electricity; namely, Volta-electric induction and magneto-electric induction. If two wires, A and B, be placed side by side, but not in contact, and a Voltaic current be passed through A, there is instantly a current produced by induction in B, in the opposite direction. Although the principal current in A be continued, still the secondary current in B is not found to accompany it, for it ceases after the first moment, but when the principal current is stopped, then there is a second current produced in B, in the opposite direction to that of the first produced by the inductive action, or in the same direction as that of the principal current.

"If a wire, connected at both extremities with a galvanometer, be coiled in the form of a helix around a magnet, no current of electricity takes place in it. This is an experiment which has been made by various persons hundreds of times, in the hope of evolving electricity from magnetism, and as in other cases in which the wishes of the experimenter and the facts are opposed to each other, has given rise to very conflicting conclusions. But if the magnet be withdrawn from or introduced into such a helix, a current of electricity is produced whilst the magnet is in motion, and is rendered evident by the deflection of the galvanometer. If a single wire be passed by a magnetic pole, a current of electricity is induced through it which can be rendered sensible."

Before having any knowledge of the method given in the above account, I had succeeded in producing electrical effects in the following manner, which differs from that employed by Mr. Faraday, and which appears to me to develop some new and interesting facts. A piece of copper wire, about thirty feet long and covered with elastic varnish, was closely coiled around the middle of the soft iron armature of the galvanic magnet described in Vol. XIX of the *American Journal of Science,* and which, when excited, will readily sustain between six hundred and seven hundred pounds. The wire was wound upon itself so as to occupy only about one inch of the length of the armature which is seven inches in all. The armature, thus furnished with the wire, was placed in its proper position across the ends of the galvanic magnet, and there fastened so that no motion could take place. The two projecting ends of the helix were dipped into two cups of mercury, and there connected with a distant galvanometer by means of two copper wires, each about

forty feet long. This arrangement being completed, I stationed myself near the galvanometer and directed an assistant at a given word to immerse suddenly, in a vessel of dilute acid, the galvanic battery attached to the magnet. At the instant of immersion, the north end of the needle was deflected 30° to the west, indicating a current of electricity from the helix surrounding the armature. The effect, however, appeared only as a single impulse, for the needle, after a few oscillations, resumed its former undisturbed position in the magnetic meridian, although the galvanic action of the battery, and consequently the magnetic power, was still continued. I was, however, much surprised to see the needle suddenly deflected from a state of rest to about 20° to the east, or in a contrary direction when the battery was withdrawn from the acid, and again deflected to the west when it was re-immersed. This operation was repeated many times in succession, and uniformly with the same result, the armature the whole time remaining immovably attached to the poles of the magnet, no motion being required to produce the effect, as it appeared to take place only in consequence of the instantaneous development of the magnetic action in one, and the sudden cessation of it in the other.

This experiment illustrates most strikingly the reciprocal action of the two principles of electricity and magnetism, if indeed it does not establish their absolute identity. In the first place, magnetism is developed in the soft iron of the galvanic magnet by the action of the currents of electricity from the battery, and secondly, the armature, rendered magnetic by contact with the poles of the magnet, induces in its turn currents of electricity in the helix which surrounds it; we have thus, as it were, electricity converted into magnetism and this magnetism again into electricity.

Another fact was observed which is somewhat interesting, inasmuch as it serves in some respects to generalize the phenomena. After the battery had been withdrawn from the acid, and the needle of the galvanometer suffered to come to a state of rest after the resulting deflection, it was again deflected in the same direction by partially detaching the armature from the poles of the magnet to which it continued to adhere from the action of the residual magnetism, and in this way, a series of deflections, all in the same direction, was produced by merely slipping off the armature by degrees until the contact was entirely broken. The following extract from the register of the experiments

exhibits the relative deflections observed in one experiment of this kind.

At the instant of immersion of the battery, deflection 40° west.

At the instant of emersion of the battery, deflection 18° east.

Armature partially detached, deflection 7° east.

Armature entirely detached, deflection 12° west.

The effect was reversed in another experiment, in which the needle was turned to the west in a series of deflections by dipping the battery but a small distance into the acid at first and afterwards immersing it by degrees.

From the foregoing facts it appears that a current of electricity is produced, for an instant, in a helix of copper wire surrounding a piece of soft iron whenever magnetism is induced in the iron; and a current in an opposite direction when the magnetic action ceases; also that an instantaneous current in one or the other direction accompanies every change in the magnetic intensity of the iron.

Since reading the account before given of Mr. Faraday's method of producing electrical currents I have attempted to combine the effects of motion and induction; for this purpose a rod of soft iron ten inches long and one inch and a quarter in diameter, was attached to a common turning lathe, and surrounded with four helices of copper wire in such a manner that it could be suddenly and powerfully magnetized, while in rapid motion, by transmitting galvanic currents through three of the helices; the fourth being connected with the distant galvanometer was intended to transmit the current of induced electricity; all the helices were stationary while the iron rod revolved on its axis within them. From a number of trials in succession, first with the rod in one direction, then in the opposite, and next in a state of rest, it was concluded that no perceptible effect was produced on the intensity of the magneto-electric current by a rotary motion of the iron combined with its sudden magnetization.

The same apparatus, however, furnished the means of measuring separately the relative power of motion and induction in producing electrical currents. The iron rod was first magnetized by currents through the helices attached to the battery and while in this state one of its ends was quickly introduced into the helix connected with the galvanometer; the deflection of the needle in this case was seven degrees. The end of the rod was next introduced into the same helix while in its natural state and then suddenly magnetized; the deflection in this instance

amounted to thirty degrees, showing a great superiority in the method of induction.

The next attempt was to increase the magneto-electric effect while the magnetic power remained the same, and in this I was more successful. Two iron rods six inches long and one inch in diameter were each surrounded by two helices and then placed perpendicularly on the face of the armature, and between it and the poles of the magnet, so that each rod formed, as it were, a prolongation of the poles, and to these the armature adhered when the magnet was excited. With this arrangement, a current from one helix produced a deflection of thirty-seven degrees; from two helices both on the same rod, fifty-two degrees, and from three fifty-nine degrees; but when four helices were used, the deflection was only fifty-five degrees, and when to these were added the helix of smaller wire around the armature, the deflection was no more than thirty degrees. This result may perhaps have been somewhat affected by the want of proper insulation in the several spires of the helices; it, however, establishes the fact that an increase in the electric current is produced by using at least two or three helices instead of one. The same principle was applied to another arrangement which seems to afford the maximum of electric development from a given magnetic power; in place of the two pieces of iron and the armature used in the last experiments, the poles of the magnet were connected by a single rod of iron, bent into the form of a horse-shoe, and its extremities filed perfectly flat so as to come in perfect contact with the faces of the poles; around the middle of the arch of this horse-shoe, two strands of copper wire were tightly coiled one over the other. A current from one of these helices deflected the needle one hundred degrees, and when both were used the needle was deflected with such force as to make a complete circuit. But the most surprising effect was produced when, instead of passing the current through the long wires to the galvanometer, the opposite ends of the helices were held nearly in contact with each other, and the magnet suddenly excited; in this case a small but vivid spark was seen to pass between the ends of the wires, and this effect was repeated as often as the state of intensity of the magnet was changed.

In these experiments the connection of the battery with the wires from the magnet was not formed by soldering, but by two cups of mercury, which permitted the galvanic action on the magnet to be instantaneously suspended and the polarity to be changed and rechanged without removing the battery from the acid; a succession of vivid sparks was

obtained by rapidly interrupting and forming the communication by means of one of these cups; but the greatest effect was produced when the magnetism was entirely destroyed and instantaneously reproduced by a change of polarity.

It appears from the May number of the *Annals of Philosophy* that I have been anticipated in this experiment of drawing sparks from the magnet by Mr. James D. Forbes of Edinburgh, who obtained a spark on the 30th of March; my experiments being made during the last two weeks of June. A simple notification of his result is given, without any account of the experiment, which is reserved for a communication to the Royal Society of Edinburgh; my result is therefore entirely independent of his and was undoubtedly obtained by a different process.

Electrical self-induction in a long helical wire

I have made several other experiments in relation to the same subject, but which more important duties will not permit me to verify in time for this paper. I may, however, mention one fact which I have not seen noticed in any work, and which appears to me to belong to the same class of phenomena as those before described; it is this: when a small battery is moderately excited by diluted acid, and its poles which should be terminated by cups of mercury, are connected by a copper wire not more than a foot in length, no spark is perceived when the connection is either formed or broken; but if a wire thirty or forty feet long be used instead of the short wire, though no spark will be perceptible when the connection is made, yet when it is broken by drawing one end of the wire from its cup of mercury, a vivid spark is produced. If the action of the battery be very intense, a spark will be given by the short wire; in this case it is only necessary to wait a few minutes until the action partially subsides, and until no more sparks are given from the short wire; if the long wire be now substituted a spark will again be obtained. The effect appears somewhat increased by coiling the wire into a helix; it seems also to depend in some measure on the length and thickness of the wire. I can account for these phenomena only by supposing the long wire to become charged with electricity, which by its re-action on itself projects a spark when the connection is broken. (Silliman's *American Journal of Science,* July, 1832, Vol. XXII., pp. 403-408; *Scientific Writings,* Vol. I., p. 73.)

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FARADAY

(FOR BIOGRAPHY SEE VOL. VIII.)

ELECTRICITY FROM MAGNETISM

Read November 24, 1831.

1. The power which electricity of tension possesses of causing an opposite electrical state in its vicinity has been expressed by the general term Induction; which, as it has been received into scientific language, may also, with propriety, be used in the same general sense to express the power which electrical currents may possess of inducing any particular state upon matter in their immediate neighborhood, otherwise indifferent. It is with this meaning that I purpose using it in the present paper.

2. Certain effects of the [illegible] of electrical currents have already been recognized and described: as those of magnetization; Ampère's experiments of bringing a copper disc near to a flat spiral; his repetition with electro-magnets of Arago's extraordinary experiments, and perhaps a few others. Still it appeared unlikely that these could be all the effects which induction by currents could produce; especially as, upon dispensing with iron, almost the whole of them disappear, whilst yet an infinity of bodies, exhibiting definite phenomena of induction with electricity of tension still remain to be acted upon by the induction of electricity in motion.

3. Further: whether Ampère's beautiful theory were adopted, or any other, or whatever reservation were mentally made, still it appeared very extraordinary, that, as every electric current was accompanied by a corresponding intensity of magnetic action at right angles to the current, good conductors of electricity, when placed within the sphere of this action, should not have any current induced through them, or some sensible effect produced equivalent in force to such a current.

4. These considerations, with their consequence, the hope of obtaining electricity from ordinary magnetism, have stimulated me at various times to investigate experimentally the inductive effect of electric currents. I lately arrived at positive results; and not only had my hopes fulfilled, but obtained a key which appeared to me to open out a

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full explanation of Arago's magnetic phenomena, and also to discover a new state, which may probably have great influence in some of the most important effects of electric currents.

5. These results I purpose describing, not as they were obtained, but in such a manner as to give the most concise view of the whole.

Evolution of Electricity from Magnetism

27. A welded ring was made of soft round bar-iron, the metal being seven-eighths of an inch in thickness, and the ring six inches in external diameter. Three helices were put round one part of this ring, each containing about twenty-four feet of copper wire one-twentieth of an inch thick; they were insulated from the iron and each other, and superposed in the manner before described (6), occupying about nine inches in length upon the ring. They could be used separately or conjointly; the group may be distinguished by the letter A, Fig. 1. On the other part of the ring about sixty feet of similar copper wire in two pieces were applied in the same manner, forming a helix B, which had the same common direction with the helices of A, but being separated from it at each extremity by about half an inch of the uncovered iron.

28. The helix B, was connected by copper wires with a galvanometer three feet from the ring. The helices of A were connected end to end so as to form one common helix, the extremities of which were connected with a battery of ten pairs of plates four inches square. The galvanometer was immediately affected, and to a degree far beyond what has been described when with a battery of tenfold power helices without iron were used (10); but though the contact was continued, the effect was not permanent, for the needle soon came to rest in its natural position, as if quite indifferent to the attached electromagnetic arrangement. Upon breaking the contact with the battery, the needle was again powerfully deflected, but in the contrary direction to that induced in the first instance.

29. Upon arranging the apparatus so that B should be out of use, the galvanometer be connected with one of the three wires of A (27), and the other two made into a helix through which the current from the trough (28) was passed, similar but rather more powerful effects were produced.

30. When the battery contact was made in one direction, the galvanometer-needle was deflected on the one side; if made in the other direction, the deflection was on the other side. The deflection on breaking the battery contact was always the reverse of that produced by completing it. The deflection on making a battery contact always in-

dicated an induced current in the opposite direction to that from the battery; but on breaking the contact the deflection indicated an induced current in the same direction as that of the battery. No making or breaking of the contact at B side, or in any part of the galvanometer circuit, produced any effect at the galvanometer. No continuance of the battery current caused any deflection of the galvanometer-needle. As the above results are common to all these experiments, and to similar ones with ordinary magnets to be hereafter detailed, they need not be again particularly described.

31. Upon using the power of 100 pairs of plates (10) with this ring, the impulse at the galvanometer, when contact was completed or broken, was so great as to make the needle spin round rapidly four or five times, before the air and terrestrial magnetism could reduce its motion to mere oscillation.

39. But as might be supposed that in all the preceding experiments of this section, it was by some peculiar effect taking place during the formation of the magnet, and not by its mere virtual approximation, that the momentary induced current was excited, the following experiment was made. All the similar ends of the compound hollow helix (34) were bound together by copper wire, forming two general terminations, and these were connected with the galvanometer. The soft iron cylinder (34) was removed, and a cylindrical magnet three-quarters of an inch in diameter and eight inches and a half in length, used instead. One end of this magnet was introduced into the axis of the helix, Fig. 4, and then, the galvanometer-needle being stationary, the magnet was suddenly thrust in; immediately the needle was deflected in the same direction as if the magnet had been formed by either of the two preceding processes (34, 36). Being left in, the needle resumed its first position, and then the magnet being withdrawn the needle was deflected in the opposite direction. These effects were not great; but by introducing and withdrawing the magnet, so that the impulse each time should be added to those previously communicated to the needle, the latter could be made to vibrate through an arc of 180° or more.

40. In this experiment the magnet must not be passed entirely through the helix, for then a second action occurs. When the magnet is introduced the needle at the galvanometer is deflected in a certain direction; but being in, whether it be pushed quite through or withdrawn, the needle is deflected in a direction the reverse of that previously produced. When the magnet is passed in and through at one continuous

motion, the needle moves one way, is then suddenly stopped, and finally moves the other way.

41. If such a hollow helix as that described (34) be laid east and west (or in any other constant position), and a magnet be retained east and west, its marked pole always being one way; then whichever end of the helix the magnet goes in at, and consequently whichever pole of the magnet enters first, still the needle is deflected the same way: on the other hand, whichever direction is followed in withdrawing the magnet, the deflection is constant, but contrary to that due to its entrance.

57. The various experiments of this section prove, I think, most completely the production of electricity from ordinary magnetism. That its intensity should be very feeble and quantity small, cannot be considered wonderful, when it is remembered that like thermo-electricity it is evolved entirely within the substance of metals retaining all their conducting power. But an agent which is conducted along the metallic wires in the manner described; which, whilst so passing possesses the peculiar magnetic actions and force of a current of electricity; which can agitate and convulse the limbs of a frog; and which, finally, can produce a spark by its discharge through charcoal (32), can only be electricity. As all the effects can be produced by ferruginous electro-magnets (34), there is no doubt that arrangements like the magnets of Professors Moll, Henry, Ten Eyke, and others, in which as many as two thousand pounds have been lifted, may be used for these experiments; in which case not only a brighter spark may be obtained, but wires also ignited, and, as the current can pass liquids (23), chemical action be produced. These effects are still more likely to be obtained when the magneto-electric arrangements to be explained in the fourth section are excited by the powers of such apparatus.

58. The similarity of action, almost amounting to identity, between common magnets and either electro-magnets or volta-electric currents, is strikingly in accordance with and confirmatory of M. Ampère's theory, and furnishes powerful reasons for believing that the action is the same in both cases; but, as a distinction in language is still necessary, I propose to call the agency thus exerted by ordinary magnets, magneto-electric or magnelectric induction (26).

59. The only difference which powerfully strikes the attention as existing between volta-electric and magneto-electric induction, is the suddenness of the former, and the sensible time required by the latter: but even in this early state of investigation there are circumstances which seem to indicate, that upon further inquiry this difference will, as a philosophical distinction, disappear (68).

EDUCATION
(1781-1833)

THE EDUCATION of the last of the eighteenth and the first of the nineteenth century was influenced mostly by the ideas of Rousseau and Pestalozzi.

Rousseau (1712-1778) believed that "everything is good as it comes from the hand of the Author of Nature; but all things degenerate in the hands of man." On this principle he called education back from the vicious artificiality of French society to the extreme limit of naturalness. He emphasized the study of infancy. He would allow free movement by taking off the child's clothes, heed his tears as petitions of wrongs to be righted, let him grow up of himself and pay no attention to anything but physical education until the child is over twelve years old. When he falls do not go to him until he stops crying; let experience teach him to do no harm; let punishment come only as the consequences of the child's own actions; remember that nothing is more difficult to distinguish in infancy than real stupidity from the taciturnity that is the mark of a great mind, and be satisfied with a small vocabulary at first. When the time comes for further education let it be an education by observation of things rather than from books. Rousseau's "Emile" should be read, though not necessarily followed, by every parent. It made naturalness the fashion in French society and has exerted an enormous influence ever since.

The work of Pestalozzi (1746-1827) was in many ways built upon Rousseau's ideas. He made the school more interesting to the child than his home or playground. There was entire sympathy between the

teacher and the pupil. He tried to develop the feeling and will as well as the intellect, and to teach as far as possible through the self-activity of the child.

PESTALOZZI

JOHANN HEINRICH PESTALOZZI was born at Zurich, Switzerland, January 12, 1746. He studied theology and law and then took to farming. The farm was a failure and in 1775 he started sort of a pauper school, rooming, boarding and clothing the children in return for their work in the field. By 1780 this experiment had also failed. His wife's fortune was now exhausted and they had great trouble making both ends meet.

In 1781 he published his great educational novel, "Leonard and Gertrude." This gives a practical illustration of his ideas.

In 1798 he was put in charge of an orphan asylum at Stanz, where he developed his practice of education. In 1799 with Kruesi he opened a new school in Burgdorf castle. In 1802 the government aided his work there, but in 1804 he started a new institute at Yverdun. This soon had a world-wide reputation. For many years the school gathered the greatest educators of the country about it, but was at last, in 1825, broken up by dissensions among the teachers. He died February 17, 1827.

Theoretically, he would probably be classed as building upon the principle of naturalness laid down by Comenius and Rousseau. He stands particularly for a sympathy between teacher and pupil and for the union of learning and manual effort. He is a good example of a man intellectually somewhat simple, who nevertheless, accomplished great good from the greatness of his moral purposes, and the fulness of his sympathy with children and mankind.

The following selections were made by Barnard from Pestalozzi's "Leonard and Gertrude." The lieutenant is supposed to embody Pestalozzi's ideas.

THE SCHOOL IN BONNAL

I A Good School is Founded

Since the squire had returned from Cotton Meyer's, he had spent every moment he could spare with his lieutenant, in consultation with him on the organization of the new school. They both came to the conclusion that a child is always well educated when he has learned to practice skilfully, orderly, and to the benefit of him and his, what is to be his future occupation.

This principal object of all education seemed to them at once the requisite of a reasonable school for human beings. And they perceived that the lieutenant, and any person proposing to establish a good school for farmers' and factory children, must either himself know and understand what such children need to know and do, in order to become capable farmers and factory workers; or, if he does not himself understand it, that he must inquire and learn about it, and have those at hand who do know and can show him.

They naturally thought first of Cotton Meyer himself, and immediately after this conversation, and their meal, they went to him.

"This is the man of whom I have said so much to you," said the squire to the lieutenant, and then to Meyer, "And this is a gentleman who, I hope, will encourage you about your school."

Meyer did not understand; but the squire explained to him, saying that this was to be the schoolmaster of the village.

Meyer could not sufficiently wonder at this, and after a time he said, "If the gentleman is willing to take so much pains, we cannot thank him enough; but it will require time to become well acquainted with our condition and ways in the village."

Lieutenant. "I presume so; but one must begin some time or other; and I shall not regret any pains I take to examine as thoroughly as possible what is needed, and what your children can properly learn, in order to be well-fitted for their farming and manufacturing."

Meyer. "That will be an excellent beginning."

Lieut. "I do not know how else I ought to begin; and I shall take every opportunity of becoming acquainted with all manner of house and field labor, so as to learn correctly what training and what example your children need, in order to the right education for their vocation and circumstances."

Meyer's Mareieli was quite at home with the lieutenant. She showed him all about the house, and in the stables, what the children must do, to learn to do in good order whatever was necessary for themselves and their parents; made them dig in the garden and throw earth hither and thither, to even the ground and improve its appearance, and adjust the edges; and to scatter fodder correctly. The more he saw, the more questions he asked; inquired how they measured hay, reckoned tithes, and kept account of the cotton manufacture; what was the difference of wages in different kinds of cotton, and a hundred other things. These they explained to him as far as they could. Then he proposed to teach the children how to spin. But Mareieli said, "We take in some hundred *zentners* of yarn in a year, and I have never yet brought them to spin right well. And I cannot complain about it, either; for they have to do a good deal in the fields and about the cattle. But if you desire to see a good arrangement for the matter of spinning, you must go to see the mason's wife. With her, there is something to be seen on that point; but not with us."

Lieut. "Is not the mason's wife, of whom you spoke, named Gertrude?"

Mareiele. "It seems that you know her already."

Lieut. "No; but the squire had proposed to go directly from you to her."

Mareieli. "Well; then you will see that I told you correctly."

2. A Good School is the Foundation of All Good Fortune

Gertrude's room was so full, when they entered, that they could scarcely pass between the wheels. Gertrude, who had not expected to see any strangers, told the children, as the door opened, to get up and make room. But the squire would not let one of them move, but gave his hand first to the pastor and then to the lieutenant, to lead them behind the children, next the wall, to Gertrude's table.

You could not believe how much the scene delighted these gentlemen. What they had seen with Cotton Meyer seemed as nothing, in comparison.

And very naturally. Order and comfort about a rich man do not surprise. We think hundreds of others do not do so well, because they have not money. But happiness and comfort in a poor hut, showing so unanswerably that everybody in the world could be comfortable, if they could maintain good order and were well brought up—this astonishes a well-disposed mind almost beyond power of expression.

But the gentlemen had a whole room full of such poor children, in the full enjoyment of such blessings, before their eyes. The squire seemed for a time to be seeing the picture of the first-born of his future better-taught people, as if in a dream; and the falcon eyes of the lieutenant glanced hither and thither like lightning, from child to child, from hand to hand, from work to work, from eye to eye. The more he saw, the fuller did his heart grow with the thought: She has done, and completely, what we seek; the school which we look for is in her room.

The room was for a time as still as death. The gentlemen could do nothing but gaze and gaze, and be silent. But Gertrude's heart beat at the stillness and at the marks of respect which the lieutenant showed to her during it, and which bordered on reverence. The children, however, spun away briskly, and laughed out of their eyes to each other; for they perceived that the gentlemen were there on their account, and to see their work.

The lieutenant's first words to Gertrude were, "Do these children all belong to you, mistress?"

"No," said Gertrude, "they are not all mine;" and then she pointed out, one after another, which were hers and which were Rudi's.

"Think of it, lieutenant," said the pastor, "these children who belong to Rudi could not spin one thread four weeks ago."

The lieutenant looked at the pastor, and at Gertrude, and answered, "Is it possible?"

Gertrude. "That is not remarkable. A child will learn to spin right well in a couple of weeks. I have known children to learn it in two days."

Squire. "It is not that which I am wondering at in this room, but quite another thing. These children of other people, since the three or four weeks ago when Gertrude received them, have come to look so differently, that in truth I scarcely knew one of them. Living death, and the extremest misery, spoke from their faces; and these are so gone that no trace of them is left."

The lieutenant replied, in French, "But what does she do to the children then?"

Squire. "God knows."

Pastor. "If you stay here all day, you hear no tone, nor see any shadow of anything particular. It seems always, and in everything she does, as if any other woman could do it; and certainly the commonest wife would never imagine that Gertrude was doing, or could do, anything which she herself could not."

Lieut. "You could not say more to raise her in my estimation. That is the culmination of art, where men think there is none at all. The loftiest is so simple that children and boys think they could do much more than that."

As the gentlemen conversed in French, the children began to look at each other and laugh. Heireli and the child who sat opposite to her made mouths to each other, as if to say, "*Parlen, parlen, parlen.*"

Gertrude only nodded, and all was still in a moment. And then the lieutenant, seeing a book lying on every wheel, asked Gertrude what they were doing with them.

Ger. "Oh, they learn out of them."

Lieut. "But not while they are spinning?"

Ger. "Certainly."

Lieut. "I want to see that."

Squire. "Yes, you must show us that, Gertrude."

Ger. "Children, take up your books and learn."

Children. "Loud, as we did before?"

Ger. "Yes, loud, as you did before; but right."

Then the children opened their books, and each laid the appointed page before him, and studied the lesson which had been set. But the wheels turned as before, although the children kept their eyes wholly on the books.

The lieutenant could not be satisfied with seeing, and desired her to show him everything relating to her management of the children, and what she taught them.

She would have excused herself, and said it was nothing at all but what the gentlemen knew, and a thousand times better than she.

But the squire intimated to her to proceed. Then she told the children to close their books, and she taught them, by note, a stanza from the song,

> "How beautiful the sunbeams' play,
> And how their soft and brilliant ray
> Delights and quickens all mankind—
> The eye, the brain, and all the mind!"

The third stanza, which they were then learning, reads thus:—

> "The sun is set. And thus goes down,
> Before the Lord of Heaven's frown,
> The loftiness and pride of men,
> And all is dusk and night again."

She repeated one line at a time, distinctly and slowly, and the children said it after her, just as slowly, and very distinctly, and did so over and over, until one said, "I know it now." Then she let that one repeat the stanza alone, and when he knew every syllable, she permitted him to repeat it to the others, and them to repeat it after him, until they knew it. Then she began with them all three of the stanzas, of which they had already learned the first two. And then she showed the gentlemen how she taught them arithmetic; and her mode was the simplest and most practical that can be imagined.

But of that I shall speak again in another place.

3. Recruiting Officer's Doings

The lieutenant was every moment more convinced that this was the right instruction for his school; but he was also convinced that he needed a woman like this, if the giving it was to be not merely possible, but actual.

A Prussian recruiting officer does not contrive so many means of getting into the service a fellow who comes up to the standard, as the lieutenant contrived to decoy into his trap this woman, who came up to his standard in school teaching.

"But, mistress," he began, "could not the arrangements in your room here be introduced into a school?"

She thought a moment, and replied, "I don't know. But it seems as if what is possible with ten children is possible with forty. But it would require much; and I do not believe that it would be easy to find a schoolmaster who would permit such an arrangement in his school."

Lieut. "But if you knew of one who desired to introduce it, would you help him?"

Ger. (*Laughing*). "Yes, indeed; as much as I could.

Lieut. "And if I am he?"

Ger. "Are what?"

Lieut. "The schoolmaster, who would be glad to organize such a school as you have in your room."

Ger. "You are no schoolmaster."

Lieut. "Yes I am. Ask the gentlemen."

Ger. "Yes, perhaps, in a city, and in something of which we know neither *gigs* nor *gags*."

Lieut. "No; but honestly, in a village."

Ger. (*Pointing to the wheels.*) "Of such children?"

Lieut. "Yes, of such children."

Ger. "It is a long way from me to the place where schoolmasters for such children look like you."

Lieut. "Not so far."

Ger. "I think it is."

Lieut. "But will you help me, if I undertake to organize my school in that way?"

Ger. "If it is far away, I will not go with you."

Lieut. "I shall remain here."

Ger. "And keep school?"

Lieut. "Yes."

Ger. "Here in the room?"

Lieut. "No; in the school-room."

Ger. "You would be sorry, if you should be taken at your word."

Lieut. "But you still more, if you should have to help me."

Ger. "No; it would please me."

Lieut. "You have said twice that you would help me."

Ger. "I have—and I say so three times, if you are our schoolmaster." Here he and the other gentlemen began to laugh; and the squire said, "Yes, Gertrude; he is certainly your schoolmaster."

This perplexed her. She blushed, and did not know what to say.

Lieut. "What makes you so silent?"

Ger. "I think it would have been well if I had been as silent for a quarter of an hour back."

Lieut. "Why?"

Ger. "How can I help you, if you are a schoolmaster?"

Lieut. "You are looking for excuses; but I shall not let you go."

Ger. "I will beg you."

Lieut. "It will be of no use; if you had promised to marry me, you must abide by the promise."

Ger. "No, indeed!"

Lieut. "Yes, indeed!"

Ger. "It is out of the question."

Squire. "If there is anything which you know, Gertrude, do it as well as you can; he will not ask anything more; but, whatever you do to help him, you will do to help me."

Ger. "I will, very willingly; but you see my room is full of children, and how I am tied down. But, with regard to advice and help in matters relating to work, which a gentleman naturally cannot understand, I know a woman who understands them much better than I; and she can do whatever I cannot."

Squire. "Arrange it as you can; but give him your hand on the bargain."

4. A Proud Schoolmaster

The new condition of affairs raised the courage of the pastor, who had been almost in the state of a slave under the old squire; and his acquaintance with the son contributed much toward accomplishing his ancient plans. On the next Sunday he explained to the people some chapters of the Bible; and, at the end of the service, he called for whatever else was to be done. Then the squire took the lieutenant by the hand, and told him to say himself to the congregation what he desired to do for their children.

The lieutenant arose, bowed to the squire, the pastor, and the congregation, took off his hat, leaned on his stick, and said: "I have been brought up with a nobleman, and am myself a nobleman; but I am not for that reason ashamed to serve God and my fellow-men in the situation which Providence calls me; and I thank my dear parents, now under the ground, for the good education they gave me, and which enables me now to put your school on such a footing that, if God will, your children shall all their lives be respected for having attended it. But it is not my business to make long speeches and sermons; but, if it please God, I will begin my school instruction to-morrow, and then everything will be made plain. Only I will say that each child should bring his work, whether sewing, or spinning cotton, or whatever it be, and the instruments for the same, until the squire shall purchase such for the school."

"And what will he do with spinning-wheels in the school?" said men and women to each other in all their seats, and one, behind him, so loud that he heard it.

The lieutenant turned around and said aloud, "Nothing, except to make the children learn to read and cipher, of each other."

This the farmers could not get into their heads how the scholars could learn to read and cipher of each other; and many of them said, at the church door, "It will be with him as it was with the madder-plants, and the beautiful sheep that the old squire had brought from two hundred leagues away, and then let them die miserably at their fodder." But some older and experienced man said, "He does not look at all like the madder-plants; and has not the appearance of a man who talks carelessly."

That evening the lieutenant went into the school-room, and nailed up, opposite to where he was going to sit, a beautiful engraving. This represented an old man, with a long white beard, who, with wrinkled brow and eyes wide open, lifted up his finger.

The squire and the pastor said, "What is that for?"

Lieut. "He is to say to me, 'Gluelphi, swear not, while you sit there before me!' "

They replied, "Then we will not pull him down, he fills too important a place."

Lieut. "I have been considering about it."

5. School Organization

Next morning the lieutenant began with his school. But I should not readily recommend any other schoolmaster to do what he did, and after such a Sunday's proclamation, which was considered proud by everybody, then cause his school to be put in order by a farmer's wife. Still, if he be a Gluelphi, he may do it, and it will not injure him; but I mean a real Gluelphi, not a pretended one.

He let Gertrude put the children in order, just as if she had them at home.

She divided them according to age, and the work they had, as they could best be put together; and placed her own and Rudi's children, who were already accustomed to her management, between others. In front, next the table, she put those who did not know their A, B, C; next behind them, those who were to spell; then those who could read a little, and last those who could read fluently. Then, for the first row, she put only three letters on the blackboard, and taught them to them. Whichever knew them best was to name them aloud, and the others were to repeat them after him. Then she changed the order of the letters, wrote them larger and smaller, and so left them before their eyes all the morning. In like manner she wrote up several letters, for the scholars who were learning to spell, and those who could read a little had to spell with these letters. But these, as well as those who could read fluently, were to have their books always open by their spinning-wheels, and to repeat it in a low tone of voice after one who read aloud. And every moment they were saying to that one, "Go on."

For the work, Gertrude had brought a woman with her, named Margaret, who was to come to the school every day; as Gertrude had no time for that purpose.

This Margaret understood her business so well that it would not be easy to find another like her. As soon as any child's hand, or wheel, was still, she stepped up to him, and did not leave him until all was going on in good order again.

Most of the children carried home that evening so much work that their mothers did not believe they had done it alone. But many of the children answered, "Yes; it makes a difference whether Margaret shows us, or you." And in like manner they praised the lieutenant, their schoolmaster.

In the afternoon he conducted the school, and Gertrude watched him, as he had her in the morning; and things went so well that she said to him, "If I had known that I could finish all my work in helping you organize the school in a couple of hours, I should not have been so troubled on Thursday."

And he was himself pleased that things went so well.

That evening he gave to each of the children over seven years old, a couple of sheets of paper, stitched together, and a couple of pens; and each child found his name written thereon as beautifully as print. They could not look at them enough; and one after another asked him how they were to be used. He showed them; and wrote for them, for a quarter of an hour, such great letters that they looked as if they were printed. They would have watched him until morning, it seemed so beautiful to them, and they kept asking him if they were to learn to do the same.

He answered, "The better you learn to write, the better I shall be pleased." At dismissal, he told them to take care of their paper, and to stick the points of their pens into rotten apples; for that was the very best way to keep them.

To this, many of the children answered, "Yes, that would be nice, if we had any rotten apples; but it is not winter now."

At this he laughed, and said, "If you have none, perhaps I can get them for you. The pastor's wife has certainly more than she wants."

But other children said, "No, no; we will get some, we have some yet."

6. School Organization—Continued

The children all ran home, in order quickly to show their beautiful writing to their parents; and they praised the schoolmaster and Margaret, as much as they could. But many answered, "Yes, yes; new brooms sweep clean;" or some such singular expression, so that the

children did not understand what they meant. This troubled the good children, but still they did not cease to be pleased; and if their parents took no pleasure in their beautiful writing, they showed it to whomever they could, to their little brothers in the cradle, and to the cat on the table; and took such care of them as they had never in their lives taken of anything before. And if the little brother reached out his hand, or the cat its paw, after them, they quickly drew them back, and said, "You must only look at it with your eyes; not touch it." Some of them put theirs away in the Bible. Others said they could not open such a great book, and put them in a chest, among the most precious things they had. Their joy at going to school again was so great that the next morning many of them got up almost before day, and called their mothers to get them quickly something to eat, so that they might get to school in good season. On Friday, when the new writing-benches, which the squire had had made, were ready, their pleasure was very great. During the first lesson, they would all sit together; but the lieutenant divided them into four classes, in order that there should not be too many of them, and that none should escape him, and none could make a single mark that he did not see.

In this study also most of the children did very well. Some learned so easily, that it seemed to come to them of itself; and others, again, did well, because they had been more in the habit of doing things that required attention. Some, however, who had never had very much in their hands except the spoon with which they ate, found great difficulties. Some learned arithmetic very easily, who found writing very hard, and who held the pen as if their hands had been crippled. And there were some young loafers among them, who had all their lives scarcely done anything except run about the streets and fields, and who, nevertheless, learned almost everything far quicker than the rest.

So it is in the world. The most worthless fellows have the best natural endowments, and usually exceed, in intelligence and capacity, those who do not wander about as much, but sit at home at their work. And the arithmeticians among the farmers are usually to be found at the tavern.

The schoolmaster found these poor children generally much more capable, both in body and in mind, than he had expected.

For this there is also a good reason. Need and poverty make men more reflective and shrewd than riches and superfluity, and teach him to make the best use of everything that will bring him bread.

Gluelphi made so much use of this fact, that, in everything he did, and in almost every word he used, in the school, he had the distinct purpose of making use of this basis laid down by nature herself, for the education of the poor and of countrymen. He was so strenuous, even, about the sweat of daily labor, that he claimed that whatever can be done for a man, makes him useful, or reliable for skill, only so far as he has acquired his knowledge and skill in the sweat of his years of study; and that, where this is wanting, the art and knowledge of men is like a mass of foam in the sea, which often looks, at a distance, like a rock rising out of the abyss, but which falls as soon as wind and wave attack it. Therefore, he said, in education, thorough and strict training to the vocation must necessarily precede all instruction by words.

He also maintained a close connection between this training to a vocation and training in manners, and asserted that the manners of every condition and trade, and even of the place or country of a man's abode, are so important to him, that the happiness and peace of all his life depends on them. Training to good manners was thus also a chief object of his school organization. He would have his school-room as clean as a church. He would not even let a pane be out of the windows, or a nail be wrongly driven in the floor; and still less would he permit the children to throw anything on the floor, eat during study, or anything else of the kind. He preserved strict order, even in the least thing; and arranged so that, even in sitting down and rising up, the children would not hit against each other.

In muddy weather they were made to leave their shoes at the door, and sit in their stockings. And if their coats were muddy, they had to dry them in the sun, or at the stove, as the case might be, and clean them. He himself cut their nails for many of them, and put the hair of almost all of the boys in good order; and whenever anyone went from writing to working, he was obliged to wash his hands. They had, likewise, to rinse out their mouths at proper times, and take care of their teeth, and see that their breath was not foul. All these were things they knew nothing about.

When they came into the school and went out, they stepped up to him, one after the other, and said to him, "God be with you." Then he looked at them from head to foot, and looked at them so that they knew by his eye, without his saying a word, if there was anything wrong about them. But if this look did not serve to set things right, he spoke to them. When he saw that the parents were to blame for anything, he

sent a message to them; and, not uncommonly, a child came home to its mother with the message, "You, the schoolmaster sends his respects, and asks whether you have no needles, or no thread; or if water is expensive with you," and the like.

Margaret was as if she had been made on purpose to help him about these things. If a child's hair was not in good order, she placed it with its spinning-wheel before her, and braided it up while the child studied and worked. Most of them did not know how to fasten their shoes or stockings. All these things she showed them; adjusted their neck-cloths and aprons, if they were wrong, and, if she saw a hole in their clothes, took a needle and thread and mended it. At about the close of the school, she went through the room, praising or blaming the children, as they worked well, half well, or ill. Those who had done well, then went first up to the schoolmaster, and said to him, "God be with you," and then he held out his hand to them and replied, "God be with you, you dear child!" Those who had done only half-well, came then to him; and to them he only said, "God be with you," without holding out his hand to them. Lastly, those who had not done well at all had to leave the room before the others, without daring to go to him at all.

If one of them came too late, he found the door shut, like the gate of a fortress that is closed. Whether then he cried or not made no difference; the master said to him, briefly, "Go home again, now; it will do you good to think a long time about it. Everything that is done must be done at the right time, or else it is as if it is not done at all."

7. God's Word is the Truth

Thus every word he said, was intended, by constantly accustoming the children to what they would in the future have to say and do, to lead them into true wisdom in life; for he endeavored, with every word, to plant deep in their minds such a foundation of equanimity and peace, as every man can possess in all circumstances, if the difficulties of his lot are early made to be another nature to him. And this is the central part of the difference between his mode of instructing the children, and that of other schoolmasters.

The efficiency of his labor soon convinced the pastor of Bonnal of the importance of that distinction; and caused him to see that all verbal instruction, so far as it aims at true human wisdom, and that highest end of this wisdom, true religion, must undoubtedly be subordinated to

constant exercises in useful domestic labor; and that that mouth-religion which consists in memory-work and controversial opinions may be forgotten, as soon as, by constant exercises in useful practical exertion, a better foundation is laid for good and noble aspirations; that is, for true wisdom and true religion.

But the pastor saw that he himself knew little of any such management of men, and that the lieutenant, and even Margaret, accomplished more in that direction than he did by preaching for hours, or by doing whatever else he could. He was ashamed of himself in the comparison, but he aided their undertaking, learned from both of them whatever he could, and, in everything which he taught his children, founded upon what the lieutenant and Margaret practiced. But in proportion as these latter accustomed their children to useful labor, so much did he shorten his verbal instructions.

This he would gladly have done long before; but he did not know how to begin it, or how to continue it. He had indeed dreamed of what the lieutenant and Margaret were doing; but he could not deprive his children of such benefits as were derivable from the old system of instruction, for the sake of mere dreams of what he could not execute. But now that he saw a better truth, and the advantage of practice in doing over practice in teaching, he followed after that better truth, and in his age made giant strides in the change of his method of popular instruction.

From this time forward he permitted his children to learn no more dogmas by rote—such, for example, as those apples of discord, the questions which for two hundred years have split good Christians into so many parties, and which certainly, for country people, have not made easier the way to everlasting life; for he was every moment more convinced that man loses little or nothing by losing mere words.

But while he, like Luther, with the help of God, struck down the foolish verbiage of mere mouth-religion, still he did not serve up instead of it a new one of the same kind, one of his own instead of the strange one; but united his efforts with those of the lieutenant and Margaret, to train his children, without many words, to a peaceful and laborious life in their vocations; by constantly accustoming them to a wise mode of life; to stop up the sources of ignoble, shameful, and disorderly practices, and in this manner to lay the foundation of a quiet and silent habit of worship of God, and of a pure, active, and equally silent benevolence to men.

To attain this end, he based every word of his brief instructions in religion upon the doings and omissions of the children, their circumstances and duties in life; so that, when he talked with them of God and eternity, he seemed to be speaking of father and mother, of house and home—of things closely connected with this world.

He pointed out to them with his own hand a few wise and pious portions which they were still made to learn by rote from the book. Of the rest of the prolix, quarrelsome gabble, which he desired to empty out of their brains, as the summer melts away the winter snow, he saved nothing at all; and if anyone began to talk to him about it, he said that he saw more clearly every day that it was not good for men to have heads filled up with too many whys and wherefores, and that daily experience showed that, just in proportion as men carried about such whys and wherefores in their heads, they lost in their degree of natural understanding, and the daily usefulness of their hands and feet. And he no longer permitted any child to learn a long prayer by heart; saying openly that it was contrary to the express spirit of Christianity, and to the command which the Saviour gave to his disciples, "But thou when thou prayest," etc.

8. To Be as Good as a Man Can Be He Must Appear Bad

The best thing about him was, that he said plainly, all that he did, "If I had not seen the lieutenant and Margaret doing this in their school-room with the children, I should have remained, as to their instruction, even until death, the old pastor in Bonnal, without any change, just as I have been for thirty years. I was not in a condition to undertake the chief parts of the true instruction of these children; and all that I can do for it, even now, is this: not to lay any hindrance in the way of the lieutenant and Margaret."

He was quite right; for of the ordinary employments of men, and of most things upon which the lieutenant based his proceedings, he knew nothing whatever. He both knew men, and did not know them. He could describe them in such a way that you would have to say, "Yes, they are thus." But he did not know them so that he could mingle with them, and correct or accomplish anything about them. And the lieutenant often told him directly that he was not capable of accomplishing any real reform amongst men; that he would only destroy them with his goodness. For how kind soever the lieutenant might seem always, no one could easily have stricter principles of education that he.

He openly maintained, that "Love is useless in the training of men, except behind or by the side of fear. For they must learn to root up thorns and thistles; and men could never do that willingly, never of themselves, but only when they are obliged, or have become accustomed to. One who would set anything right with men, or bring them up to any proposed point, must gain the mastery of their evil qualities, must follow up their falsehood, and must make them sweat with pain for their crooked ways. The education of men is nothing except the polishing of single members of the great chain by which all humanity is bound together. Faults in the education and guidance of men consist mostly in this, that we take single links out of the chain and undertake to ornament them, as if they were isolated, and were not links belonging to that great chain; and as if the power and usefulness of that single member depended upon its being gilded, or silvered, or set with precious stones; and not upon its being well-knit to its next neighbors without any weakening, and being strongly and pliantly adapted to the daily vibrations of the whole chain, and to all its movements."

Thus spoke the man whose strength consisted in his knowledge of the world, to the clergyman, whose weakness consisted in his ignorance of it.

But it was the labor of the life of the former to acquire a knowledge of men; and he always felt gratitude to his deceased father, for having made this his design from youth up. His father had thought many men good who were not, by reason of insufficient knowledge with them; and the sorrow therefrom resulting cost him his life. A few days before his death, he called Gluelphi, then eleven years old, to his bedside, and said, "Child, trust no one, all your life, until you have experience of him. Men betray and are betrayed; but to know them, is worth gold. Respect them, but trust them not; and let it be your daily task to write down every evening what you have seen and heard."

And therewith the last tears came from his eyes, and soon they were closed. And from that day, Gluelphi had not omitted, any evening, to follow the death-bed advice of his father. He had also preserved all his written records, from youth. They are to him a treasure of knowledge of human nature; and he calls them by no name except the good bequest of his dear deceased father; and he often moistens them with tears. They make a thousand heavy hours pleasant to him, and have been, in his school also, a guide which has quickly led him to the object he has desired.

He knew the children in a week, better than their parents in seven years; and, according to his principles, set himself to make them sweat for pain if they undertook to keep anything secret from him, and especially to keep their hearts always open to his eyes.

9. He Who Separates the Principles of Arithmetic and of Susceptibility to Truth Puts Asunder What God Has Joined

But how much soever he cared for the hearts of his children, he took as much care for their heads; and required whatever went into them should be as clear and comprehensible as the silent moon in the heavens. He said, "Nothing can be called teaching, which does not proceed on that principle; what is obscure, and deceives, and makes confused, is not teaching, but perverting the mind."

The perversion of the mind, in his children, he guarded against, by teaching them, above all, to see and hear closely; and by laboriously and industriously teaching them habits of cool observation, and at the same time by strengthening in them the natural capacity which every man possesses. To this end, he practiced them especially in arithmetic; in which he carried them so far, within a year, that they very soon yawned if anyone began to talk to them about the wonderful puzzles with which Hartknopf's friends so easily astonished the rest of the people in the village.

So true is it, that the way to lead men away from error is, not to oppose their folly with words, but to destroy the spirit of it within them. To describe the night, and the dark colors of its shadows, does not help you see; it is only by lighting a lamp, that you can show what the night was; it is only by couching a cataract, that you can show what the blindness has become. Correct seeing and correct hearing is the first step toward living wisely; and arithmetic is the means by which nature guards us from error in our searches after truth; the basis of peace and prosperity, which children can secure for their manhood only by thoughtful and careful pursuit of their employments.

For such reasons, the lieutenant thought nothing so important as a right training of his children in arithmetic; and he said, "A man's mind will not proceed well, unless it gains the habitude of apprehending and adhering to the truth, either by means of much experience, or of arithmetical practice, which will in great part supply the place of that habitude."

But his methods of teaching them arithmetic are too extended to be given here.

10. A Sure Means Against Mean and Lying Slanders

In this matter also he succeeded with the children as he desired; and it could not but happen that one, who accomplished so much for them, should become dear to many people. But it was far from being the case that all were satisfied with him. The chief charge against him was, that he was too proud for a schoolmaster, and would not talk with the people at all. He said one thing and another to defend himself, and tried to make them understand that he was using his time and his lungs for their children; but the farmers said that, notwithstanding all that, he might stop a moment or two when anyone wanted to say something to him, and, if pride did not prevent him, he would.

All the children, to be sure, contradicted their parents in this, and said that he certainly was not proud, but they replied, "He may be good to you, and may be proud nevertheless."

But the rainy weather, in the third week of his school-keeping, accomplished for him, what the good children could not do, with all their talking.

It was an established principle in Bonnal, that an old bridge, in front of the schoolhouse, decayed for twenty years, should not be replaced; and so, whenever it rained for two days together, the children had to get wetted almost to their knees, to get to school. But the first time the Gluelphi found the street so deep in water, he stood out in the street, as soon as the children came, in the middle of the rain, and lifted them, one after another, over the stream.

This looked very funny to a couple of men and their wives, who lived just opposite the schoolhouse, and who were exactly those who had complained most that his pride would scarcely let him say good day and good night to the people. They found great pleasure in seeing him get wet through and through, in his red coat, and thought he would never keep it a quarter of an hour, and expected every moment that he would call out to them to know whether nobody was coming to help him. But when he continued right on with his work, just as if not even a cat lived anywhere near him, not to say a man, and was dripping wet, clothes and hair, and all over, and still showed no shadow of impatience, but kept carrying over one child after another, they began to say, behind their windows, "He must be a good-natured fool, after all, to keep it up so long, and we seem to have been mistaken about him. If he had been proud, he would certainly have stopped long ago."

At last they crept out of their holes and went to him, and said,

"We did not see, before, that you were taking so much trouble, or we would have come out to you sooner. Go home and dry yourself; we will carry the children over. We can bear the rain better than you, and before school is out, we will bring a couple of planks, too, so that there shall be a bridge here, as there used to be."

This they did not say merely, but did it. Before eleven o'clock, there was actually a bridge erected, so that after school the scholars could go dry shod over the brook. And, also, the complaints about his pride ceased; for the two neighbors' wives, who had been the loudest in making them, now sang quite another song.

If this seems incredible to you, reader, make an experiment yourself, and stand out in the rain for the sake of other people's children, without being called on to do so, or receiving anything for it, until you are dripping wet; and then see whether those people do not then willingly speak good of you, and do good to you; and whether they say anything evil of you, except in regard to something actually and very evil, or something which they cannot see and understand to be otherwise than bad.

II. Foolish Words and School Punishments

But it was not long before the people had something else to complain about; and, indeed, something worse than before. The Hartknopf party in the village, that is, discovered the lieutenant was not a good Christian; and began quietly to make good and simple people in the village believe it. One of the first to find comfort in this story, and to endeavor to propagate it, was the old schoolmaster. He could not endure that all the children should so praise and love the new schoolmaster. As long as he had been schoolmaster, they had hated him; and he had become so used to this, in thirty years, that he believed it must be so; and asserted that the children, not being able to understand what is good for them, naturally hate all discipline, and consequently all schoolmasters. But he made not much progress with this theory; and he fancied people were going to tell him that the children loved their present schoolmaster because he was good to them.

This vexed him; for he could not endure, all his life, to have it flung at him that his own foolishness was the reason the children did not love him, although it was the honest truth. If he observed the least thing which he disapproved, the first word was, "You are killing me, body and soul; you will bring me into my grave. If you did not deserve hell for any other reason, you deserve it on account of me;" and the like.

Such language, especially to children, does not cause good feelings; and they must have been much more than children to be able to love a fool, who spoke to them in that way every moment. They knew whom they were dealing with, and when he was most enraged, they would say to each other, "When we kill again, and bring him some sausages and meat, we shall not go to hell any more, at least as long as he has any of them left to eat."

With the new schoolmaster the case was quite otherwise. His harshest reproofs to the children, when they did wrong, were, "That is not right," or "You are injuring yourself," or "In that way you will never arrive at anything good," etc. Little as this was, it was effectual, because it was the truth.

Gluelphi's punishments consisted mostly in exercises intended to help the faults which they were to punish. For instance, if a child was idle, he was made to carry stone for the guard-fence, which the teacher was making some of the older boys construct, at the sand-meadow, or to cut fire-wood, etc. A forgetful one was made school-messenger, and for four or five days had to transact whatever business the teacher had in the village.

Even during his punishments, he was kind to the children, and scarcely ever talked more with them than while punishing them. "Is it not better for you," he would often say to a careless one, "to learn to keep yourself attentive to what you do, than every moment to be forgetting something, and then have to do everything over again?" Then the child would often throw himself upon him with tears, and, with his trembling hand in his, would reply, "Yes, dear Herr Schoolmaster." And he would then answer, "Good child. Don't cry; but learn better; and tell your father and mother to help you overcome your carelessness, or your idleness."

Disobedience, which was not carelessness, he punished by not speaking publicly to such a child, for three, or four, or five days, but only alone with him; intimating to him, at the close of school, to remain. Impertinence and impropriety he punished in the same way. Wickedness, however, and lying, he punished with the rod; and any child punished with the rod, was not permitted, during a whole week, to join in the children's plays; and his name and his fault stood entered in the Register of Offenses, unmistakable evidence of improvement, when they were stricken out again.

So great was the difference between the old and the new organization of the school

POLITICAL IDEAS IN THE UNITED STATES

(1833-1860)

THE GENERAL SITUATION in the United States in the time of Van Buren was briefly this: The old Republican party had split into the Jacksonian Democrats and the Whigs, the latter led by Clay and Webster. The doctrine of abolition was being fiercely urged by such men as Benjamin Lundy, William Lloyd Garrison, Wendell Phillips and the other members of the New England Anti-Slavery Society, and as violently opposed by the whole South and the great majority in the North. The invention of the railroad by George Stephenson in 1814 and its recent introduction into the United States was vastly reducing distances, and rendering the representative system far more easily and widely applicable. In fact, the period was one of inventions; friction matches were first made in 1829, the McCormick reaper in 1831, the screw propeller in 1836; anthracite coal was first used to produce steam in 1836, and steamships began to cross the Atlantic in 1838.

The rapid settlement of the Western lands and the great increase of stock companies had brought about a period of gigantic speculation. The lack of solidity was vastly increased by the fact that there was no sort of supervision of banks by the government and no guarantee of the value of bank money. The crash that always follows such a situation came in 1837 and was probably the worst this country has ever known. Van Buren tried to "divorce bank and State" by adopting subtreasuries. The law, passed in 1840, repealed by the Whigs in 1841 and repassed by the Democrats, was a financial policy of permanent

value. The memory of the recent panic, however, gave the election of 1840 to the Whigs, the northern wing of which was now re-enforced by the Southern "State Rights Whigs" under John Tyler, the two divisions being alike only in their opposition to the Jacksonians.

Harrison died a month after he was elected President and Tyler vetoed the measures passed by the northern Whigs.

In 1836 Texas had won its independence from Mexico and was knocking for admission to the Union. Van Buren was committed against it, but the Southern wing of the Democrats, led by Calhoun, struggled for the annexation of Texas as an increase of slave territory and forced the nomination of "the dark horse," James K. Polk. The Whigs nominated Clay. The abolition movement had split in 1840 into the Liberty party, who now nominated James Birney, and the followers of Garrison, who declared the Constitution "a covenant with death and an agreement with hell," who took no political action, and clamored for the dissolution of the "Union with slave-holders."

The nomination of Polk was the first news sent by the telegraph which had just been perfected by Samuel Morse. Polk received 170 electoral votes to 105 for Clay.

The war with Mexico followed and ended by the acquisition, besides Texas, of all that vast territory south of Oregon, Idaho, and Wyoming.

In the campaign of 1848 the Democrats nominated Lewis Cass of Michigan, the Whigs General Zachary Taylor of Louisiana, and the Free-Soil party, made up of the Liberty party and other radical anti-slavery men, supported Van Buren. The Democratic platform (1848) lauded the recent war and the establishment of a tariff for revenue only and left the question of slavery to the States. The Whigs, made up of discordant elements, had never yet dared to formulate a platform of principles. The Free-Soilers stood for a total exclusion of slavery from the territories. The personal popularity of General Taylor gave him 163 electoral votes against 127 for Cass.

The discovery of gold in California in 1848 had brought a rush of settlers to that territory, and in 1849 it applied for admission as a state with a constitution prohibiting slavery. Much of it lay below the line of the southern boundary of Missouri (36° 30′). This brought the whole question of slavery extension to a fever heat. At length after heated debate, Henry Clay, who represented the principle of eternal compromise, got passed the compromise acts of 1850. These (1)

admitted California as a free State, but formed the new slave territories of Utah (including Nevada) and New Mexico (including Arizona) : they (2) abolished the slave trade from the District of Columbia, but on the other hand passed a more stringent fugitive slave law. This fugitive slave law cost the Whigs the anti-slavery vote, while the reopening of the slave question solidified the Southern Democracy. Webster lost his commanding position in the North as the result of supporting the compromise.

The Whig party in 1852, following its policy of nominating a candidate personally popular, supported General Scott and the compromise, deprecating all further discussion of slavery. The united Democrats continued to give over the question of slavery to the States, reaffirming most of the platform accepted in 1840, 1844, and 1848, and nominated Franklin Pierce of New Hampshire. The Free-Soil party supported John P. Hale, also of New Hampshire. Pierce received 254 electoral votes, as against 42 for Scott. This was the death-blow of the old Whig party. It had been led by great men, but had been composed of disparate elements and had never stood for any principle unless implicitly for the policy of compromise.

At the beginning of his administration Pierce congratulated the country that the slavery question was settled, but the words had hardly been uttered before it was reopened again. Calhoun, Webster and Clay were now dead. The leaders opposed to slavery, now becoming prominent, were Seward of New York, Chase of Ohio, and Sumner of Massachusetts. In the South Jefferson Davis and Alexander Stephens were the new leaders. The chief of the Northern Democrats was Stephen A. Douglas of Illinois. Riots over runaway slaves were everywhere exciting the country. Douglas tried to take the slave question out of politics and at the same time conciliate the South by bringing forward his "squatter sovereignty" idea, leaving the question of the admission of slavery to the vote of the territories, and organized Kansas and Nebraska on this basis. Instead of compromising the question this crystallized the forces on each side. Local warfare arose in Kansas and Nebraska. The Democrats against the extension of slavery gradually withdrew from the party. Such prominent Democrats as Sumner and Chase solemnly protested against the act. Seward delivered his "higher law" speech, in which he declared that higher than the Constitution there was a law of God forbidding the extension of slavery.

In 1856 the Free-Soil elements met as the new Republican party

and nominated General Fremont. The Democrats nominated James Buchanan and supported "squatter sovereignty." The remnant of the Whigs supported Fillmore, the candidate of the meteoric American party, whose slogan was "America for Americans." Buchanan received 174 votes, Fremont the amazing number of 114, and Fillmore 8.

"Squatter sovereignty," after almost a general guerrilla warfare in Kansas and Nebraska, was nevertheless throwing these territories into the struggle on the side of freedom. In 1858, however, the Supreme Court cast a firebrand into the midst of the contentions by the Dred Scott Decision. This decided that a negro taken into a free state did not thereby become free; that a slave was property and cannot sue for freedom in a Federal court, and that *Congress* had no right to keep slavery out of the territories. The next step to this might be that neither a *territory* nor even a *state* could keep it out of its borders. The Republican party cried out against this decision with all its power. Douglas and Lincoln held their famous debates in Illniois. Douglas supported his "squatter sovereignty" idea and declared himself willing to abide by the Supreme Court in all cases. Lincoln denounced the "squatter sovereignty" idea and the extension of slavery and boldly declared that he considered the "Dred Scott Decision" erroneous, and that the Republican party would, if possible, bring about its revocation.

In the debate Douglas was forced to stand by his principle that a territory could keep out slavery. This estranged the Southern wing of the party.

In 1860 the Republicans nominated Lincoln on a platform practically embodying the principles mentioned above.

Just before the Democratic convention Jefferson Davis, the leader of the Buchanan wing of the Democrats, had introduced a set of resolutions in the Senate declaring that neither Congress nor a territory could prohibit slavery in a territory and that it was the duty of Congress to see that all territories should be kept open to slavery. At Charleston the Douglas and Southern Democrats split upon this issue and the Southern delegates walked out of the convention. The convention met again at Baltimore, June 18, and again split. The Northern Democrats nominated Douglas, the Southern John C. Breckinridge of Kentucky. In the meantime the Constitutional Union party had nominated Bell of Tennessee on a platform lauding the Union and ignoring the question of slavery. Lincoln received 180 electoral votes and a popular vote of 1,866,452; Douglas received only 12 electoral votes but a popular vote

of 1,375,157; Breckinridge was given 72 electoral votes and 847,959 popular; Bell obtained 39 electoral votes and 590,631 popular votes. Douglas was strongest in the Northern States, but was beaten there by Lincoln; Bell showed his strength in the border States. It is a fact not generally known, however, that Lincoln had an absolute majority of votes over all candidates in all the States he carried except California and Oregon.

Preparations for secession had been going on in the South ever since Lincoln's election had become assured. Members of Buchanan's cabinet had actually aided in fitting out the South for war. South Carolina seceded in December, 1860, and in February the Confederacy was organized at Montgomery, Alabama. Jefferson Davis was chosen president and Alexander Stephens of Georgia, who had opposed secession until his State had actually seceded, was made vice-president.

BASIL HALL

Basil Hall (1788-1844) was the second son of Sir James Hall, bart. He entered the navy in 1802, and wrote several descriptions of the voyages he took part in. In 1827-28 he traveled in North America. His descriptions of American customs were exceedingly frank, but undoubtedly honest. He looked on slavery as a condition to be studied, rather than as a great theoretical wrong to be righted.

SLAVE CONDITIONS

On looking at the map of America, abreast of Georgia, a number of islands will be observed, such as Tybee, Ossabaw, Sapelo, and St. Simon's. These make no great show on paper, but they are very important in commerce, as being the spots on which the finest kind of cotton is raised. In strictness, what is called, technically, "Sea Island cotton" is not confined to these insular districts, but grows at various places on the main coast, and also for some distance from the sea, in the swampy regions bordering on most of the great rivers. The term

is now used, therefore, to describe a particular sort of cotton, the essential characteristic of which is the length of fibre or staple, in contradistinction to the less valuable kind, with a short staple, which, from growing further from the sea, at a higher level, has acquired the name of Upland cotton, or, in the brevity of commercial language, "Uplands."

Various motives attracted us to St. Simon's island, and we certainly were well repaid for the little round of a couple of hundred miles which it cost us. One wears seven-league boots in America!

The process of raising the cotton and preparing it afterwards, and incidentally the internal discipline of a well-managed property, of course engaged our attention. As we had also the advantage of consulting persons of long experience, and perfect fairness, the following sketch will probably be found correct.

On a "Sea Island" plantation which I visited, there were 122 slaves employed in the culture of cotton. Of these, 70 were men and women, between the ages of fourteen and fifty—48 children under the age of fourteen—and 4 superannuated. The 70 workers were classed as follows:

39 of them were called full hands.
16 three-quarter hands.
11 half hands.
4 quarter hands.

Making in all, out of the 70 persons, 57½ "taskable hands." Those actually in the field were 44 taskables, while the remaining 13½ were employed as cart drivers, nurses, cooks for the negroes, carpenters, gardeners, house servants, and stock-minders—what we should call in Scotland herds; in England, I believe, herdsmen.

The ground under tillage consisted of 200 acres of cotton, and 25 of Indian corn, potatoes, and other things of that description. This gave about 5 acres to a full hand in the field. Several ploughs were occasionally used, the ploughmen being included in the 44 field hands.

The fields are divided by temporary stakes, into square patches of 105 feet each way, equal to a quarter of an acre. These portions, which are called "tasks," are laid off in ridges or beds, five feet apart, on which the cotton is to be planted. When land has been thus previously bedded, the first operation in spring, is to hoe down the weeds and grass from the beds, into the furrows between them. This is what is called "listing." A full hand lists half an acre per day. The next

operation is with the plough, throwing up two furrows on each side of the list, which forms a ridge. The people then follow with the hoe, and finish off the bed. Here, as the work is light, the "task" or portion of ground staked off, is three-quarters of an acre.

Two hands then proceed to open holes on the top of the beds, crosswise, 18 inches apart, and of the width of the hoe. Another hand follows, and scatters about 50 cotton seeds in each hole, while two hands come after to cover them up to the depth of an inch and a half, patting the soil down.

The planting is scarcely finished before hoeing is required, as the weeds and grass spring up very fast. The "task" during this stage of the business is half an acre. It is necessary to hoe the cotton about once a fortnight. At the second hoeing the cotton plants are thinned out, till only about seven of every group remain each one as far apart as possible from another. On the third hoeing, a further thinning takes place amongst the plants, when one or two only are left, the cotton being left thickest on poor lands.

In September, or perhaps earlier, the cotton begins to open in "good blow," at which stage it is fit for gathering. One hand picks from 90 to 100 pounds of what is called seed cotton, from the seeds being still in it. A woman generally performs about twice as much of this kind of work as a man can do. After gathering it into the barns, it has to be assorted according to its quality. This also is generally done by women, assisted by those men who happen to be on the invalid list, or who from age are incapable of heavy labour. The different kinds of cotton are, "first quality white," "second quality white," and "yellow."

It is a very troublesome job to get rid of the seeds, in consequence of their being so closely enveloped in the cotton. They form nearly two-thirds of the weight of the whole.

The process of cleaning is commenced by carrying the cotton into the open air, and allowing it to dry in the sun, which is necessary in all cases before taking it to the "gin-house," where the seeds are separated from the cotton by machinery. The ingenious apparatus, called the Cotton Gin, is the invention of an American of the name of Whitney; it consists of two little wooden rollers, each about as thick as a man's thumb, placed horizontally, and touching each other. On these being put into rapid motion, handfuls of the cotton are cast upon them, which, of course, are immediately sucked in. But there being no room

for the seeds to pass, they are left behind, while the cotton is drawn through and delivered clean on the other side of the rollers. It is obvious, however, that the mere motion of the rollers during this sucking-in process would not alone be sufficient to detach the seeds from the fibres of the cotton in which they are wrapped up. In order to loosen them, a sort of comb fitted with iron teeth, each of which is a couple of inches in length and seven-tenths of an inch distant from its neighbour, is made to wag up and down with considerable velocity, in front of the rollers. This rugged comb, which is equal in length to the rollers, lies parallel to them, with the sharp ends of its teeth almost in contact with them. By the quick wagging motion given to this comb by the machinery, the buds of cotton cast upon the rollers are torn open just as they are beginning to be sucked in. The seeds, now released from the coating which had encircled them, fly off like sparks, to the right and left, while the cotton itself passes between the rollers.

In spite of all this tugging and tearing, however, certain seeds, or portions of seeds, more obstinate than the rest, do contrive to insinuate themselves between the rollers, and so pass along in company with the cotton, getting, of course, well crushed for their pains. I observed that the tips or sharp ends of the teeth of the iron comb sometimes gave the seeds a tap which broke them in pieces, and allowed the fragments to be drawn forward with the cotton. These stray particles are afterwards separated by hand—a process which is called moting. One hand can mote from twenty to thirty pounds per day. The smaller bits of the seeds, which may still remain, are afterwards blown away, when the cotton is whisked about in a light wheel, through which a current of air is made to pass. On its being gathered up, when tossed out of this winnowing machine, it is carried to the packing-house, where, by means of screws, it is forced into bags of 300 pounds each. These are sewed up and sent to the sea-coast, where they undergo a second squeezing, which reduces them to half their original size—by a process I shall have occasion to describe—at Mobile and New Orleans, after which they are ready for being shipped as the cotton of commerce.

With respect to the amount of labour performed by the slaves in the culture and preparation of cotton, I may mention that in all cases of tasking—whether this term be applied to field or housework—a three-quarter, a half, or a quarter hand, is required to work only that proportion of a task per day. Applications are made every year by

the slaves to the overseer, or to their master, to reduce the *quantum* of labor from the higher to lower grades. This method of tasking, or defining their work, is that which the slaves prefer to any other. Active hands get through their proportion generally by the middle of the day, others in two-thirds of the day, after which they are left to employ the balance, as it is rather well called, or what remains of daylight, in their own fields, in fishing, or in dancing;—in short, as they please. The driver puts them to work in the morning, and sees that all is properly executed before they go away.

The young slaves, of course, come in as one-quarter hands, and are gradually raised. Every negro knows his rate, and lawful task, so well, that if he thinks himself imposed upon by the driver, he appeals at once to the master. The tasks formerly described are the highest ever exacted on cotton grounds, and when the land is rough, or the grass and weeds are very numerous and difficult to eradicate, there must be some reduction.

The stated allowance of food to every slave, over fourteen years of age, is nine quarts of Indian corn per week, and for children, from five to eight quarts. This is said to be more than they can eat, and the surplus is either sold, or is given to the hogs and poultry which they are always allowed to rear on their own account. A quart of salt monthly is also allowed, and salt fish, as well as salt beef occasionally, but only as a favour, and can never be claimed as a right. A heaped-up bushel of sweet potatoes is considered equal to the above allowance, and so are two pecks of rough, that is, unhusked, rice or paddy. But this is not thought so substantial a food as the Indian corn.

On the plantation to which these details refer, the negroes are allowed three holidays at Christmas, when they have plenty of beef and whisky. At the end of this period they are often, I am told, completely done up with eating, drinking, and dancing. On that plantation they are allowed to have as much land as they choose to plant, and the master's family is supplied entirely with poultry and eggs from this free work of the slaves, who are regularly paid at the following rates: Eggs, 12½ cents (6d.) a dozen; chickens, 12½ cents (6d.); fowls, 20 to 25 cents, or about a shilling a pair; ducks, twice as much. But they are left at liberty to carry their poultry to a better market if they can find one. The proceeds are mostly laid out in dress and trinkets.

The slaves are generally dressed in what is called White Welsh

plains, for winter clothing. This costs about 80 cents, or 3s. 6d. a yard, in Charleston. They prefer white cloth, and afterwards dye it of a purple colour to suit their own fancy. Each man gets seven yards of this, and the women six yards—the children in proportion. Each grown-up negro gets a new blanket every second year, and every two children in like manner one blanket. The men receive also a cap, and the women a handkerchief, together with a pair of strong shoes, every winter. A suit of homespun cotton, of the stuff called Osnaburgs, is allowed to each person for summer dress.

It is very disagreeable to speak of the punishments inflicted on these negroes, but a slave-holder must be more or less of a despot in spite of himself; for the laws neither do, nor can they, effectually interfere in the details of discipline. The master must enforce obedience to his orders and maintain general subordination, however kind-hearted he may be, by the only means which the nature of the whole system leaves in his power. The slave has, unfortunately, so few generous motives to stimulate him to work, that fear is necessarily made to enter as the chief ingredient into the discipline. It is a great mistake, however, to suppose that slaves labour sulkily, and under the perpetual exercise of the lash. On the contrary, from constant habit, they do, in point of fact, go about their work with cheerfulness; and, as their tasks are limited to what can be readily performed, it is in the power of every slave who chooses, to escape punishment for any length of time. But it seems to be indispensable to the working of this strange piece of moral machinery, that every negro should be made fully sensible that punishment will follow neglect or crime. Neither men nor women, it is most melancholy to know, can ever be exempted with safety, upon any occasion except that of sickness, from the operation of this stern but inevitable rule. When slaves are under the management of injudicious, unmethodical, dissipated, ill-tempered, or naturally cruel masters, of course the evils which ensue are too horrible to think of. But it ought to be recollected, in due fairness to the slave-holders—a class of men who are really entitled to a large share of our indulgence—that many ships of war, many regiments, and, I fear I may add, many domestic establishments, to say nothing of schools, are often—as I have witnessed in all quarters of the globe—the scenes of as revolting tyranny as any rice or cotton plantation can well be. The scale may be smaller, but the principle is exactly the same. In fairness to the planters, we ought also to recollect that the slave-holders, or by

far the greater number of them, are not possessed of that character by any voluntary act of their own. Most of these gentlemen have succeeded to their property by inheritance, or have been obliged by duty to themselves and their families to engage in that particular profession, if I may so call it. They cannot, therefore, and they ought not, consistently with their duty, to disentangle themselves from the obligations which have devolved upon them, as the masters of slaves.

I have no wish, God knows! to defend slavery in the abstract; neither do I say that it is the best state of things which might be supposed to exist in those countries; but I do think it is highly important that we should look this great and established evil squarely in the face, and consider its bearings with as little prejudice as possible. There is no other chance for its gradual improvement, I am well convinced, but this calm course, which has for its object the discovery of what is possible—not what is desirable.

One of the results which actual observation has left on my mind is, that there are few situations in life, where a man of sense and feeling can exert himself to better purpose, than in the management of slaves. So far, therefore, from thinking unkindly of slave-holders, an acquaintance with their proceedings has taught me to respect many of them in the highest degree; and nothing, during my recent journey, gave me more satisfaction than the conclusion to which I was gradually brought, that the planters of the Southern States of America, generally speaking, have a sincere desire to manage their estates with the least possible severity. I do not say that undue severity is nowhere exercised; but the discipline, taken upon the average as far as I could learn, is not more strict than is necessary for the maintenance of a proper degree of authority, without which, the whole framework of society in that quarter would be blown to atoms. The first and inevitable result of any such explosion would be the destruction of great part of the blacks, and the great additional misery of those who survived the revolt.

The evils of slavery are, indeed, manifold. Take a catalogue of the blessings of freedom, and having inverted them all, you get a list of the curses of bondage. It is twice cursed, alas! for it affects both parties, the master and the slave. The slave, in bad hands, is rendered a liar and a thief, as a matter of course; he is often systematically kept in ignorance of all he ought to be acquainted with, from the truths of religion to the commonest maxims of morality; he is sometimes treated like the beasts of the field, and like them, only better or worse, accord-

ing to the accidental character of his proprietor. On the other hand, there is in our nature a mysterious kind of reaction, which takes place in all circumstances, from the oppressed to the oppressors, the result of which is, that no man can degrade another, without in some degree degrading himself. In Turkey, for example, where the women are systematically debased—what are the men? I have the less scruple in taking this view of the matter, because it is one which, though not quite new to me, was brought to my notice on many occasions by the planters themselves, who, almost without exception, admitted to me with perfect frankness, that there was more or less of a deleterious effect produced on their own character by the unfortunate circumstances inseparable from their situation. They are compelled, at the hazard of their lives and fortunes, to maintain a system, often in the highest degree revolting to their better nature. Like officers on service, they are forced on many occasions to repress their best feelings, and act with a sternness of purpose which, though every way painful to them, cannot be relaxed for one instant.

I confess, for my own part, I have seldom felt more sincerely for any set of men, when I heard them lamenting with bitterness of spirit the evil influence of the system alluded to, infusing itself, daily and hourly, into the minds of their children, in the very teeth of their own strenuous efforts to prevent such contamination. It is a curious and perhaps instructive fact that the slaves themselves delight in encouraging "young master," or even "young mistress," to play the tyrant over them! What at first is mere sport, becomes in due time serious earnest. The difficulties, accordingly, of right education in those countries, at all stages, are magnified to a degree of which the people in happier climates can hardly have any idea.

In condemning slavery, and scorning slave-holders, we are apt to forget the share which we ourselves to contribute towards the permanence of the system. It is true, we are some three or four thousands of miles from the actual scene. But if we are to reproach the planter who lives in affluence in the midst of a slave population, it ought to be asked how he comes by the means to live at that rate. He gives his orders to the overseer, the overseer instructs the driver, who compels the negro to work, and up comes the cotton. But what then? He cannot make the smallest use of his crop, however luxuriant it be, unless, upon an invitation to divide the advantages with him, we agree to become partners in this speculation—the result of slave labour. The

transfer of the cotton from Georgia to Liverpool is certainly one step, but it is no more than a step in the transaction. Its manufacture into the goods which we scruple not to make use of, and without which we should be very ill off, is but another link in the same chain, at the end of which is the slave.

I shall be grievously misunderstood if it be supposed that I wish to lessen the general abhorrence which is felt and expressed in the northern parts of America, and in England, for slavery. But I have a very great wish to see the subject properly viewed, and not shuffled aside, as it too frequently is, when all the matters at issue are taken for granted. My reason for desiring to see it so treated arises from a conviction of there being no other way to do any good in the matter, except by considering it with steadiness and temper, and by giving due consideration to the interest and the feelings of the parties most closely connected with it—who, after all, are in strictness not one whit more culpable than ourselves, and are very often, in spite of all our abuse, the most zealous practical friends of the cause we pretend to have so much at heart. It costs us nothing to vituperate slavery and the slaveholders; and therefore we play with the subject as we please; indifferent, very often, to the interests or feelings of those persons who alone have power to do any good. It would be far better policy to obtain their co-operation by trying to show them in what their true interest consists; but it is quite vain to expect them to listen with coolness, while we are putting in jeopardy everything they hold dear in the world.

Very important advantages have arisen out of the abolition of the African slave trade with America; and although some of these have been counteracted by the rise of the internal traffic in slaves, already alluded to, there seems to be no doubt that the result of the abolition of the foreign trade in negroes has upon the whole been good.

As long as Africans, of a hundred different tribes, all equally ignorant of English, and of one another's languages, might be introduced freely into America at a low cost, to any extent, no particular care of the negroes was necessary. They might, or they might not, have domestic habits; and as for education, the thing was not dreamed of—they were imported at a mature age, were turned into the fields exactly like cattle, and there left without much more intellect. Any concert amongst such an incongruous set of beings was, of course, utterly impossible.

Of late years the case has been widely different. As no fresh

importation of negroes could take place, the slave-holders have been obliged to depend exclusively upon the reproduction of the blacks already domesticated amongst them. All the slaves in America, whatever the case might have been formerly, now learn a common language —that of their masters; and with the language they cannot fail to acquire some of the spirit that gives it energy, and renders it the vehicle to so much of what is called improvement in that country. However small a portion of this moral advancement may have become the property, if I may so call it, of the generation of slaves in existence when the foreign trade was abolished, there appears to be no doubt whatever that their successors have become decidedly better informed. The parents of the rising generation of slaves are everywhere, as I am told, so well aware of the advantage of educating their children, that although the laws in most of the slave-holding States, and the general custom in all of them, is to repress education as much as possible, they do contrive, somehow or other, to introduce more or less of it amongst their offspring. It may be very little, indeed, but that little, if generally diffused, cannot possibly fail, in some degree, to modify the character of the black population, and to give each succeeding generation a new lift in the scale of society. It is in the highest degree important, therefore, to consider the effects of this elevating progress—slow, indeed, but sure—and probably all the better for being very silent and gradual.

That slavery is an evil in itself, and eminently an evil in its consequences, no men that I have ever met with are more ready to grant than most of the American planters. That the time will come when it must cease to exist, is not, however, so general an opinion. But in the meanwhile it is admitted by all parties to be so firmly and so extensively established, and the means of doing it away to be so completely beyond the reach of any human exertions, that I consider the immediate abolition of slavery as one of the most profitless of all possible subjects of discussion.

The political problem relating to the blacks, which the practical men who shall be alive a hundred years hence may be called upon to solve, will, in all probability, be very different from that which it becomes the present generation to attempt. Whatever posterity may do, however, we of the nineteenth century, if we really expect to advance the cause of humanity in a proper and effective way, must not sit still, and scold or weep over the system of slavery, either in the abstract, as it is called, or in the practice.

The idle things I have heard on the subject of slavery, by people who had not seen a dozen black men in their lives, have sometimes reminded me of a pompous fellow who pretended to be a great sailor, till being once cross-questioned as to what he would do in a gale of wind, if it were necessary to take in the main-topsail, "O, sir," said he, "I would man the tacks and sheets—let all fly—and so disarm the gale of its fury!" Now, it is just in this fashion that many well-meaning people hope to disarm this hard slavery tempest of its terrors, by the mere use of terms which, in truth, have not the smallest application to the subject.

The planters, who are men of business, and know better how to treat the question, set about things in a more workman-like style. Their first step is to improve the condition of the negro; to feed and clothe him better—take better care of him in sickness—and encourage him, by various ways, to work cheerfully. The lash, it is true, must still, I fear, be used; but it may be handled with more method and less passion. These things, properly brought about, beget generous sympathies in both parties; for here, too, the reaction I spoke of formerly soon shows itself—the slave works not only more, but to better purpose, and as the master feels it his interest, it soon becomes his pleasure, to extend the system further—which again leads to fresh advantages and fresh reactions, all of the same salutary description.

The effect of better treatment raises the character of the slave, by giving him better habits, and thence invests him not exactly with a positive or acknowledged right to such indulgences, but certainly with a tacit or virtual claim to them. This is a great step in the progress of improvement; because the slave will now try, by good conduct, to confirm the favours he has gained, and to draw them into established usages. The master's profit, in a mere pecuniary point of view, arising out of this introduction of something like a generous motive amongst his dependents, I have the very best authority for saying, is in most cases indubitable. If experience proves that such consequences follow kind treatment, and that human nature is not dissimilar in the case of the blacks from what it is in every other, these advantages, which at first may be only casual, or contingent upon the personal character of a few masters, must in time become the usage over the plantations generally. Thus one more step being gained, fresh improvements in slave discipline—taking that word in its widest sense—would then gradually creep in under the management of wise and benevolent persons, whose

example would, of course, be imitated, if the results were productive. This progress, I have strong reason to believe, is now in actual operation in many parts of America. Better domestic habits are daily gaining ground amongst the negroes, slowly, but surely. More intelligence, better morals, and more correct religious feelings and knowledge, are also steadily making their way amongst that unfortunate race of human beings; and in no instance, I am told, have these improvements taken place without additional profit, and additional security, to the master.

At first sight there may appear to inexperienced eyes no great difficulty in bringing about these changes; but the obstacles are more numerous than we are apt to imagine. The present system of slave discipline has taken root so thoroughly and so extensively, and is so well understood by all parties—masters, overseers, drivers, and by the negroes themselves—that the introduction of any new system is opposed by the confirmed habits of all these classes. For it will be observed that, while everything in the United States relating to the free part of the population, is subject to one unceasing round of crude alterations—adopted as soon as suggested—all that concerns the blacks is maintained, for very obvious reasons, systematically in as permanent a condition as possible.

Few men, in any situation in life, or in any country, find it agreeable, or often for their interest, to act in a different manner from the rest of their class. In proportion as society generally, or any particular branch of it, is formed into ranks distinct from one another, a belief in the advantages of such uniformity gains strength. In naval and military discipline, for instance, this principle is adhered to with great exactness; and amongst the different ranks in England, any innovations upon old habits are looked upon with great suspicion. With the planters of America, it will not be wondered at, therefore, that such feelings should exist in a very strong degree. Their system of slavery, indeed, which is entirely artificial, is maintained by rules of such rigour, as could not exist a moment if any free will were allowed. Everything, therefore, which has more or less a tendency to infuse such voluntary action amongst the negroes, must, and ought to be, viewed with distrust by the planters. At all events, whether it ought to be so or not, the fact is, that such jealousy does, and will continue to prevail, in spite of all that natives or foreigners can say or do to the contrary.

If a slave-holder, therefore, either from humanity, or from ignorance, or from interested views, chooses to introduce any great or

sudden change into the administration of his estate, he will inevitably excite the suspicion, if not the ill-will, of his caste. And as few men have sufficient decision of character to persevere long in a course which they conceive to be right, when opposed by general example, all such violent changes have heretofore ended in nothing. In most cases where reform is necessary—whether in slave countries or in free ones—the true way to introduce beneficial changes is to go about them very cautiously, and as quietly as possible. This seems to be more necessary in the case of slavery than in almost any other. The new plans, whatever they be, should be allowed to insinuate themselves so gradually as to become parts of the existing system before any change has been discovered. In fact, their existence should first be made manifest by the improvement they have insensibly brought along with them. It is the veriest quackery of political legerdemain to expect that the mere alteration of speculative defects will invariably produce practical benefits. Be this, however, as it may, the slave-holders of the Southern States of America form a body of such magnitude and importance as to defy all attempts to regulate matters in any other way than what they please to countenance. Consequently, any gentleman amongst them who really wishes to do good to this cause must proceed with the most profound caution; and if, from time to time, he does hit upon practical improvements, still it will be the best policy to let them find their way slowly from his own plantation to those of his neighbours, and so on, from them to others more remote, without any bustle or effort on his part to give them currency.

It was my good fortune to observe, on more than one plantation, several excellent modifications of slave discipline, and at first I felt grieved to see their utility confined to insulated spots. But I learned in time to understand why it was best to keep things quiet, until the experiments in question, though very plausible in appearance, had been tried under a variety of circumstances. "Then, but not till then," said my friends, "if these things really be good, they will gradually creep along, and be generally adopted by our brother slave-holders."

I came at last to take a very deep interest in these subjects; and, after reflecting attentively on all their bearings, I could not help thinking that the planters might take some advantage of a device which has elsewhere proved highly efficacious in the improvement of discipline. I ventured, indeed, to recommend its adoption to several of the planters; and I shall be glad, should these pages meet the eye of any others, if they will put it to the test likewise.

The plan is simply this: All punishments, great or small, should be reported daily to the master. The drivers, in charge of the respective gangs, ought to state the names and other particulars to the overseer, and he in his turn should be made to report in writing daily to his employer. The effects, I venture to say, of this simple arrangement would be highly beneficial. The slaves would feel less oppressed, from being conscious that the master really knew what was passing; the drivers and overseers would be placed under a wholesome degree of superintendence; and the master himself, from being correctly informed on one of the most important branches of the system, might be more able to check the evil effects of passion or of indulgence on the part of his officers. Many men will permit evils to go on without inquiry, which they would shrink from giving countenance to, if actually placed before them. This plan of reporting punishments to the supreme head would make little or no change in those plantations where the master, overseer, and drivers, were men of sense and good feeling; but in every other it would probably correct the errors, or tend to correct the errors, of temper, of cruelty, or of incapacity, and could not fail, I think, to make the negroes better and happier, without the smallest risk of its leading to any relaxation of effective discipline, or diminution in the produce of their labour.

I met many planters who made no scruple in stating that, according to their view of the matter, grounded on experience, the security of the whites and their property became greater, in proportion as the negroes acquired knowledge, and that the safety of the whites was at the minimum when the blacks were kept at the lowest stage of ignorance. As this doctrine, however, is directly in the teeth of the ordinary maxims on the subject, it is right that the principle on which it rests should be distinctly explained.

The number of negroes is already very considerable, and they are increasing so rapidly, that some people imagine there will, ere long, arrive a moment of political danger from their mere physical force. Unquestionably there must always be danger from great numbers of persons combined for such a purpose as we may imagine the blacks to have in view. But I do not believe there is one man alive, who has attended to the subject, and certainly not one who has examined it on the spot, who conceives it possible that anything but slaughter and misery would be the result of such an attempt on the part of the slaves to redress their grievances, real or imaginary, by means of force alone.

Insurrections would no doubt cause unspeakable distress and ruin to their present masters; but there cannot be the shadow of a doubt, on any reasonable mind, that the slaves would be speedily overwhelmed, and either cut to pieces, or be reduced to servitude still more galling than they at present endure. Now, although all parties in America admit that this would be the result, there are many persons under the impression that in the event of a servile war in the Southern States, the free inhabitants of that section of the Union could not subdue the insurgents without the co-operation of their non-slave-holding brethren in the North. This, however, I take to be a mere chimera, without any foundation whatever in fact. The armed militia of the slave-holding States is abundantly strong for all the purposes of self-defense, even considered in a mere physical point of view. True security, it must be remembered, as far as force is considered, does not consist in numbers, but in that compact unity of purpose which cannot exist amongst slaves, but is maintained at all times amongst the free inhabitants of the South.

It is of the highest importance to the peace of those countries, that the truth of the above positions should be felt and acknowledged by the slaves themselves; because there seems every reason to believe that precisely in proportion to their advancement in knowledge, so is this conviction strengthened. But as long as they are kept in a state of ignorance, they are perpetually liable to be worked upon by designing men, who instruct them in nothing but in the extent of their numbers; and whose logic commences with the fallacy that sixty persons are necessarily stronger than six. If, however, these six have confidence in one another, and have arms in their hands, it is perfectly clear that they are superior in power, not to sixty, but to six hundred persons who can place no reliance on one another. As the slaves advance in knowledge, therefore, and learn to understand the true nature of their situation, they will only become more and more aware of the utter hopelessness of any remedy arising out of violence on their part. When this conviction is once thoroughly impressed upon their minds, they will not only be far less disposed to revolt, at the instigation of agitators, but will be in a better frame of mind to profit by those ameliorations in their condition, to which I have before alluded, as tending to the mutual advantage both of master and slave.

I grant that some part of this reasoning is theoretical; but the body of the argument is founded on a knowledge of facts, which have followed experiments sufficiently extensive and varied in their circum-

stances, to justify the hopes which it holds out of important improvements in the condition of the American slaves. This, which is the first and greatest step in the question, includes all that ought to be aimed at for the present; because it is the only one which can possibly carry with it the co-operation of the slave-holders, without whose cordial support, I must again repeat, every scheme for ameliorating the condition of the negroes appears to be utterly useless, or perhaps mischievous, as it may provoke their masters to resist all improvement whatever.

What eventual good is to spring out of all this, I do not pretend to say; and it would be idle in a partially informed stranger to speculate upon such remote contingencies, when scarcely any two persons on the spot agree about them. Some affirm that, in process of time, the race of negroes will be extirpated, and the whole country by that time being improved in its climate, may be cultivated by whites. Others assure us, that in a certain number of years—but I never could hear how many—the whole of the slave-holding States are to be under the authority of the black race. While a third set of speculators describe minutely how the negroes are to be driven, by and by, into the woods and mountains, where they are to resume their natural habits, and live like wild beasts.

Upon the whole, it is to be hoped that if, in reality, it shall be found that there is no danger, but, on the contrary, additional security, in allowing the slaves to acquire better habits and more knowledge, the planters, who alone have the power, will in time find their truest advantage to consist in the gradual improvement of the unfortunate race committed to their care.

Much is said in the South of the mischief done by the irksome and persevering exertions of the abolitionists both in America and abroad; yet I question greatly if the evil arising from such attempts at interference be in fact considerable. In many cases, I have no doubt, they have done good, by compelling the slave-holders to look about them, and to disentangle themselves from some awkward accusations, originally, perhaps, but too well founded. In many instances, certainly, the charges made have been utterly false, while in others the accusations have been so true that the planters have been in a manner forced to apply the proper remedies. In some instances, too, of which I heard more than once, the planters have actually come to a knowledge of abuses existing on their own property, of which they had no suspicion,

till roused to investigate the matter by a wish to prove the falsehood of some of these very attacks.

In concluding this important subject, I feel bound to say that, as far as I could investigate the matter, the slave system of America seems to be in as good a condition—that is to say, in as fair a train for amelioration—as the nature of so dreadful a state of things admits of. With respect to external interference, the planters will probably not be the worse of an occasional hint, even though it be rude and unpalatable. On the other hand, the abolitionists must make up their minds to suffer great and almost constant disappointments. Between the two, impartial and cool-headed men, who, without any particular views, sincerely wish well to their fellow-creatures—black as well as white—planters as well as slaves—will confine their hopes, and their exertions, to what they know is practicable, consistently with justice to all parties, and the laws of common sense.

HARRIET MARTINEAU

HARRIET MARTINEAU was born at Norwich, June 12, 1802. Dr. James Martineau, the famous divine, was her younger brother. She was educated at home until 1813, having learned Latin before she was sent to a school in the town in that year.

Her nerves were never normal. She could neither taste nor smell, and at sixteen she began to be deaf. Yet in spite of such immense difficulties and unmeant harsh treatment at home she became greatly interested in philosophy and religion and wrote an article that was accepted by the Unitarian magazine in 1821.

Her health continued poor, and in 1829 the family was left penniless by the failure of their investments.

In 1830-31 she was awarded three first prizes ($225) for essays intended to convert Catholics, Jews, and Mohammedans. In 1832 her stories illustrating political economy had a remarkable success, and she soon became immensely popular.

In 1834-5 she visited America and became a determined abolitionist. Her description of slave conditions is a vivid arraignment of the system from a woman's standpoint.

The rest of her life was spent in various literary labors. Her translation of Comte's "Positive Philosophy," which we have made use of in the previous volume, was made in 1852-53. Together with her social science tales and short articles, it gave her a prominent place among the "Positivists." She died in 1876.

MORALS OF SLAVERY

This title is not written down in a spirit of mockery; though there appears to be a mockery somewhere, when we contrast slavery with the principles and the rule which are the test of all American institutions:—the principles that all men are born free and equal; that rulers derive their just powers from the consent of the governed; and the rule of reciprocal justice. This discrepancy between principles and practice needs no more words. But the institution of slavery exists; and what we have to see is what the morals are of the society which is subject to it.

What social virtues are possible in a society of which injustice is the primary characteristic? in a society which is divided into two classes, the servile and the imperious?

The most obvious is Mercy. Nowhere, perhaps, can more touching exercises of mercy be seen than here. It must be remembered that the greater number of slave-holders have no other idea than of holding slaves. Their fathers did it: they themselves have never known the coloured race treated otherwise than as inferior beings, born to work for and to teaze the whites; helpless, improvident, open to no higher inducements than indulgence and praise; capable of nothing but entire dependence. The good affections of slave-holders like these show themselves in the form of mercy; which is as beautiful to witness as mercy, made a substitute for justice, can ever be. I saw endless manifestations of mercy, as well as of its opposite. The thoughtfulness of masters, mistresses, and their children about, not only the comforts, but the indulgences of their slaves, was a frequent subject of admiration with me. Kind masters are liberal in the expenditure of money, and (what is better) of thought, in gratifying the whims and fancies of their negroes. They make large sacrifices occasionally for the social or domestic advantage of their people; and use great forbearance in the exercise of the power conferred upon them by law and custom.

At the time when the cholera was ravaging South Carolina, a wealthy slave-holder there refused to leave the State, as most of his neighbours were doing. He would not consent to take any further care of himself than riding to a distance from his plantation (then overrun by the disease) to sleep. All day he was among his slaves: nursing them with his own hands; putting them into the bath, giving them medicine himself, and cheering their spirits by his presence and his care. He saved them almost all. No one will suppose this one of the ordinary cases where a master has his slaves taken care of as property, not as men. Sordid considerations of that kind must have given way before the terrors of the plague. A far higher strength than that of self-interest was necessary to carry this gentleman through such a work as this; and it was no other than mercy.

Again:—a young man, full of the southern pride, one of whose aims is to have as great a display of negroes as possible, married a young lady who, soon after her marriage, showed an imperious and cruel temper towards her slaves. Her husband gently remonstrated. She did not mend. He warned her, that he would not allow beings, for whose comfort he was responsible, to be oppressed; and that, if she compelled him to it, he would deprive her of the power she misused. Still she did not mend. He one day came and told her that he had sold all his domestic slaves, for their own sakes. He told her that he would always give her money enough to hire free service, when it was to be had; and that when it was not, he would cheerfully bear, and help her to bear, the domestic inconveniences which must arise from their having no servants. He kept his word. It rarely happens that free service can be hired; and this proud gentleman assists his wife's labours with his own hands; and (what is more) endures with all cheerfulness the ignominy of having no slaves.

Nothing struck me more than the patience of slave-owners. In this virtue they probably surpass the whole christian world;—I mean in their patience with their slaves; for one cannot much praise their patience with the abolitionists, or with the tariff; or in some other cases of political vexation. When I considered how they love to be called "fiery southerners," I could not but marvel at their mild forbearance under the hourly provocations to which they are liable in their homes. It is found that such a degree of this virtue can be obtained only by long habit. Persons from New England, France, or England, becoming slave-holders, are found to be the most severe masters and mis-

tresses, however good their tempers may always have appeared previously. They cannot, like the native proprietor, sit waiting half an hour for the second course, or see everything done in the worst possible manner; their rooms dirty, their property wasted, their plans frustrated, their infants slighted, themselves deluded by artifices,—they cannot, like the native proprietor, endure all this unruffled. It seems to me that every slave-holder's temper is subjected to a discipline which must either ruin or perfect it. While we know that many tempers are thus ruined, and must mourn for the unhappy creatures who cannot escape from their tyranny, it is evident, on the other hand, that many tempers are to be met with which should shame down and silence for ever the irritability of some whose daily life is passed under circumstances of comparative ease.

This mercy, indulgence, patience, was often pleaded to me in defence of the system, or in aggravation of the faults of intractable slaves. The fallacy of this is so gross as not to need exposure anywhere but on the spot. I was heart-sick of being told of the ingratitude of slaves, and weary of explaining that indulgence can never atone for injury: that the extremest pampering, for a life-time, is no equivalent for rights withheld, no reparation for irreparable injustice. What are the greatest possible amounts of finery, sweetmeats, dances, gratuities, and kind words and looks, in exchange for political, social, and domestic existence? for body and spirit? Is it not true that the life is more than meat, and the body than raiment?

This fallacious plea was urged upon me by three different persons, esteemed enlightened and religious, in relation to one case. The case was this. A lady of fortune carried into her husband's establishment, when she married, several slaves, and among them a girl two years younger than herself, who had been brought up under her, and who was employed as her own maid. The little slaves are accustomed to play freely with the children of the family—a practice which was lauded to me, but which never had any beauty in my eyes, seeing, as I did, the injury to the white children from unrestricted intercourse with the degraded race, and looking forward as I did to the time when they must separate into the servile and imperious. Mrs. —— had been unusually indulgent to this girl, having allowed her time and opportunity for religious and other instruction, and favoured her in every way. One night, when the girl was undressing her, the lady expressed her fondness for her, and said, among other things: "When I die you

shall be free;"—a dangerous thing to say to a slave only two years younger than herself. In a short time the lady was taken ill,—with a strange, mysterious illness, which no doctor could alleviate. One of her friends, who suspected foul play, took the sufferer entirely under her own charge, when she seemed to be dying. She revived; and as soon as she was well enough to have a will of her own again, would be waited on by no one but her favorite slave. She grew worse. She alternated thus, for some time, according as she was under the care of this slave or of her friend. At last, the friend excluded from her chamber every one but the physicians: took in the medicines at the room door from the hands of the slave, and locked them up. They were all analyzed by a physician, and arsenic found in every one of them. The lady partially recovered; but I was shocked at the traces of suffering in her whole appearance. The girl's guilt was brought clearly home to her. There never was a case of more cruel, deliberate intention to murder. If ever a slave deserved the gallows, (which ought to be questionable to the most decided minds,) this girl did. What was done? The lady was tender-hearted, and could not bear to have her hanged. This was natural enough; but what did she therefore do? keep her under her own eye, that she might at least poison nobody else, and perhaps be touched and reclaimed by the clemency of the person she would have murdered? No. The lady sold her.

I was actually called upon to admire the lady's conduct; and was asked whether the ingratitude of the girl was not inconceivable, and her hypocrisy too; for she used to lecture her mistress and her mistress's friends for being so irreligious as to go to parties on Saturday nights, when they should have been preparing their minds for Sunday. Was not the hypocrisy of the girl inconceivable? and her ingratitude for her mistress's favours? No. The girl had no other idea of religion,—could have no other than that it consists in observances, and, wicked as she was, her wickedness could not be called ingratitude, for she was more injured than favoured, after all. All indulgences that could be heaped upon her were still less than her due, and her mistress remained infinitely her debtor.

Little can be said of the purity of manners of the whites of the south; but there is purity. Some few examples of domestic fidelity may be found: few enough, by the confession of residents on the spot; but those individuals who have resisted the contagion of the vice amidst which they dwell are pure. Every man who resides on his plantation

may have his harem, and has every inducement of custom, and of pecuniary gain, to tempt him to the common practice. Those who, notwithstanding, keep their homes undefiled may be considered as of incorruptible purity.

Here, alas! ends my catalogue of the virtues which are of possible exercise by slave-holders towards their labourers. The inherent injustice of the system extinguishes all others, and nourishes a whole harvest of false morals towards the rest of society.

The personal oppression of the negroes is the grossest vice which strikes a stranger in the country. It can never be otherwise when human beings are wholly subjected to the will of other human beings, who are under no other external control than the law which forbids killing and maiming;—a law which it is difficult to enforce in individual cases. A fine slave was walking about in Columbia, South Carolina, when I was there, nearly helpless and useless from the following causes. His master was fond of him, and the slave enjoyed the rare distinction of never having been flogged. One day, his master's child, supposed to be under his care at the time, fell down and hurt itself. The master flew into a passion, ordered the slave to be instantly flogged, and would not hear a single word the man had to say. As soon as the flogging was over, the slave went into the back yard, where there was an axe and a block, and struck off the upper half of his right hand. He went and held up the bleeding hand before his master, saying, "You have mortified me, so I have made myself useless. Now you must maintain me as long as I live." It came out that the child had been under the charge of another person.

There are, as is well known throughout the country, houses in the free States which are open to fugitive slaves, and where they are concealed till the search for them is over. I know some of the secrets of such places; and can mention two cases, among many, of runaways, which show how horrible is the tyranny which the slave system authorises men to inflict on each other. A negro had found his way to one of these friendly houses; and had been so skilfully concealed, that repeated searches by his master, (who had followed for the purpose of recovering him,) and by constables, had been in vain. After three weeks of this seclusion, the negro became weary, and entreated of his host to be permitted to look out of the window. His host strongly advised him to keep quiet, as it was pretty certain that his master had not given him up. When the host had left him, however, the negro

came out of his hiding-place, and went to the window. He met the eye of his master, who was looking up from the street. The poor slave was obliged to return to his bondage.

A young negress had escaped in like manner; was in like manner concealed; and was alarmed by constables, under the direction of her master, entering the house in pursuit of her, when she had had reason to believe that the search was over. She flew upstairs to her chamber in the third story, and drove a heavy article of furniture against the door. The constables pushed in, notwithstanding, and the girl leaped from the window into the paved street. Her master looked at her as she lay, declared she would never be good for anything again, and went back into the south. The poor creature, her body bruised, and her limbs fractured, was taken up, and kindly nursed; and she is now maintained in Boston, in her maimed condition, by the charity of some ladies there.

The following story has found its way into the northern States (as few such stories do) from the circumstance that a New Hampshire family are concerned in it. It has excited due horror wherever it is known; and it is to be hoped that it will lead to the exposure of more facts of the same kind, since it is but too certain that they are common.

A New Hampshire gentleman went down into Louisiana, many years ago, to take a plantation. He pursued the usual method; borrowing money largely to begin with, paying high interest, and clearing off his debt, year by year, as his crops were sold. He followed another custom there; taking a Quadroon wife: a mistress, in the eye of the law, since there can be no legal marriage between whites and persons of any degree of colour; but, in nature and in reason, the woman he took home was his wife. She was a well-principled, amiable, well-educated woman; and they lived happily together for twenty years. She had only the slightest possible tinge of colour. Knowing the law that the children of slaves are to follow the fortunes of the mother, she warned her husband that she was not free, an ancestress having been a slave, and the legal act of manumission having never been performed. The husband promised to look to it: but neglected it. At the end of twenty years, one died, and the other shortly followed, leaving daughters; whether two or three, I have not been able to ascertain with positive certainty; but I have reason to believe three, of the ages of fifteen, seventeen, and eighteen; beautiful girls, with no perceptible mulatto tinge. The brother of their father came down from New Hampshire to settle the affairs; and he supposed, as every one else did, that the deceased

had been wealthy. He was pleased with his nieces, and promised to carry them back with him into New Hampshire, and (as they were to all appearance perfectly white) to introduce them into the society which by education they were fitted for. It appeared, however, that their father had died insolvent. The deficiency was very small; but it was necessary to make an inventory of the effects, to deliver to the creditors. This was done by the brother,—the executor. Some of the creditors called on him, and complained that he had not delivered in a faithful inventory. He declared he had. No: the number of slaves was not accurately set down: he had omitted the daughters. The executor was overwhelmed with horror, and asked time for thought. He went round among the creditors, appealing to their mercy: but they answered that these young ladies were "a first-rate article," too valuable to be relinquished. He next offered (though he had himself six children, and very little money), all he had for the redemption of his nieces; alleging that it was more than they would bring in the market for house or field labor. This was refused with scorn. It was said that there were other purposes for which the girls would bring more than for field or house labour. The uncle was in despair, and felt strongly tempted to wish their death rather than their surrender to such a fate as was before them. He told them, abruptly, what was their prospect. He declares that he never before beheld human grief; never before heard the voice of anguish. They never ate, nor slept, nor separated from each other, till the day when they were taken into the New Orleans slave-market. There they were sold, separately, at high prices, for the vilest of purposes: and where each is gone, no one knows. They are, for the present, lost. But they will arise to the light in the day of retribution.

It is a common boast in the south that there is less vice in their cities than in those of the north. This can never, as a matter of fact, have been ascertained; as the proceedings of slave households are, or may be, a secret: and in the north, what licentiousness there is may be detected. But such comparisons are bad. Let any one look at the positive licentiousness of the south, and declare if, in such a state of society, there can be any security for domestic purity and peace. The Quadroon connexions in New Orleans are all but universal, as I was assured on the spot by ladies who cannot be mistaken. The history of such connexions is a melancholy one: but it ought to be made known while there are any who boast of the superior morals of New Orleans, on account of the decent quietness of the streets and theatres.

The Quadroon girls of New Orleans are brought up by their mothers to be what they have been; the mistresses of white gentlemen. The boys are some of them sent to France; some placed on land in the back of the State; and some are sold in the slave-market. They marry women of a somewhat darker colour than their own; the women of their own colour objecting to them, *"ils sont si degoutants!"* The girls are highly educated, externally, and are, probably, as beautiful and accomplished a set of women as can be found. Every young man early selects one, and establishes her in one of those pretty and peculiar houses, whole rows of which may be seen in the Remparts. The connexion now and then lasts for life: usually for several years. In the latter case, when the time comes for the gentleman to take a white wife, the dreadful news reaches his Quadroon partner, either by a letter, entitling her to call the house and furniture her own, or by the newspaper which announces his marriage. The Quadroon ladies are rarely or never known to form a second connexion. Many commit suicide: more die broken-hearted. Some men continue the connexion after marriage. Every Quadroon woman believes that her partner will prove an exception to the rule of desertion. Every white lady believes that her husband has been an exception to the rule of seduction.

What security for domestic purity and peace there can be where every man has had two connexions, one of which must be concealed; and two families, whose existence must not be known to each other; where the conjugal relation begins in treachery, and must be carried on with a heavy secret in the husband's breast, no words are needed to explain. If this is the system which is boasted of as a purer than ordinary state of morals, what is to be thought of the ordinary state? It can only be hoped that the boast is an empty one.

There is no occasion to explain the management of the female slaves on estates where the object is to rear as many as possible, like stock, for the southern market: nor to point out the boundless licentiousness caused by the practice: a practice which wrung from the wife of a planter, in the bitterness of her heart, the declaration that a planter's wife was only "the chief slave of the harem." Mr. Madison avowed that the licentiousness of Virginian plantations stopped just short of destruction; and that it was understood that the female slaves were to become mothers at fifteen.

A gentleman of the highest character, a southern planter, observed, in conversation with a friend, that little was known, out of bounds, of

the reasons of the new laws by which emancipation was made so difficult as it is. He said that the very general connexion of white gentlemen with their female slaves introduced a mulatto race whose numbers would become dangerous, if the affections of their white parents were permitted to render them free. The liberty of emancipating them was therefore abolished, while that of selling them remained. There are persons who weakly trust to the force of the parental affection for putting an end to slavery, when the amalgamation of the races shall have gone so far as to involve a sufficient number! I actually heard this from the lips of a clergyman in the south. Yet these planters, who sell their own offspring to fill their purses, who have such offspring for the sake of filling their purses, dare to raise the cry of "amalgamation" against the abolitionists of the north, not one of whom has, as far as evidence can show, conceived the idea of a mixture of the races. It is from the south, where this mixture is hourly encouraged, that the canting and groundless reproach has come. I met with no candid southerner who was not full of shame at the monstrous hypocrisy.

It is well known that the most savage violences that are now heard of in the world take place in the southern and western States of America. Burning alive, cutting the heart out, and sticking it on the point of a knife, and other such diabolical deeds, the result of the deepest hatred of which the human heart is capable, are heard of only there. The frequency of such deeds is a matter of dispute, which time will settle. The existence of such deeds is a matter of no dispute. Whether two or twenty such deeds take place in a year, their perpetration testifies to the existence of such hatred as alone could prompt them. There is no doubt in my mind as to the immediate causes of such outrages. They arise out of the licentiousness of manners. The negro is exasperated by being deprived of his wife,—by being sent out of the way that his master may take possession of his home. He stabs his master; or, if he cannot fulfil his desire of vengeance, he is a dangerous person, an object of vengeance in return, and destined to some cruel fate. If the negro attempts to retaliate, and defile the master's home, the faggots are set alight about him. Much that is dreadful ensues from the negro being subject to toil and the lash; but I am confident that the licentiousness of the masters is the proximate cause of society in the south and south-west being in such a state that nothing else is to be looked for than its being dissolved into its elements, if man does not soon cease to be called the property of man. This dissolution will never

take place through the insurrection of the negroes; but by the natural operation of vice. But the process of demoralization will be stopped, I have no doubt, before it reaches that point. There is no reason to apprehend serious insurrection; for the negroes are too degraded to act in concert, or to stand firm before the terrible face of the white man. Like all deeply-injured classes of persons, they are desperate and cruel, on occasion, kindly as their nature is; but as a class, they have no courage. The voice of a white, even of a lady, if it were authoritative, would make a whole regiment of rebellious slaves throw down their arms and flee. Poison is the weapon that suits them best: then the knife, in moments of exasperation. They will never take the field, unless led on by free blacks. Desperate as the state of society is, it will be rectified, probably, without bloodshed.

It may be said that it is doing an injustice to cite extreme cases of vice as indications of the state of society. I do not think so, as long as such cases are so common as to strike the observation of a mere passing stranger; to say nothing of their incompatibility with a decent and orderly fulfillment of the social relations. Let us, however, see what is the very best state of things. Let us take the words and deeds of some of the most religious, refined, and amiable members of society. It was this aspect of affairs which grieved me more, if possible, than the stormier one which I have presented. The coarsening and hardening of mind and manners among the best; the blunting of the moral sense among the most conscientious, gave me more pain than the stabbing, poisoning, and burning. A few examples which will need no comment, will suffice.

Two ladies, the distinguishing ornaments of a very superior society in the south, are truly unhappy about slavery, and opened their hearts freely to me upon the grief which it caused them,—the perfect curse which they found it. They need no enlightening on this, nor any stimulus to acquit themselves as well as their unhappy circumstances allow. They one day pressed me for a declaration of what I should do in their situation. I replied that I would give up everything, go away with my slaves, settle them, and stay by them in some free place. I had said, among other things, that I dare not stay there,—on my own account,—from moral considerations. "What, not if you had no slaves?" "No." "Why?" "I could not trust myself to live where I must constantly witness the exercise of irresponsible power." They made no reply at the moment: but each found occasion to tell me, some

days afterwards, that she had been struck to the heart by these words: the consideration I mentioned having never occurred to her before!

Madame Lalaurie, the person who was mobbed at New Orleans, on account of her fiendish cruelty to her slaves,—a cruelty so excessive as to compel the belief that she was mentally deranged, though her derangement could have taken such a direction nowhere but in a slave country;—this person was described to me as having been "very pleasant to whites."

A common question put to me by amiable ladies was, "Do not you find the slaves generally very happy?" They never seemed to have been asked, or to have asked themselves, the question with which I replied:—"Would you be happy with their means?"

One sultry morning, I was sitting with a friend, who was giving me all manner of information about her husband's slaves, both in the field and house; how she fed and clothed them; what indulgences they were allowed; what their respective capabilities were; and so forth. While we were talking, one of the house-slaves passed us. I observed that she appeared superior to all the rest; to which my friend assented. "She is A.'s wife?" said I. "We call her A.'s wife, but she has never been married to him. A. and she came to my husband, five years ago, and asked him to let them marry: but he could not allow it, because he had not made up his mind whether to sell A.; and he hates parting husband and wife." "How many children have they?" "Four." "And they are not married yet?" "No; my husband has never been able to let them marry. He certainly will not sell her: and he has not determined yet whether he shall sell A."

Another friend told me the following story. B. was the best slave in her husband's possession. B. fell in love with C., a pretty girl, on a neighbouring estate, who was purchased to be B.'s wife. C.'s temper was jealous and violent; and she was always fancying that B. showed attention to other girls. Her master warned her to keep her temper, or she should be sent away. One day, when the master was dining out, B. came to him, trembling, and related that C. had, in a fit of jealousy, aimed a blow at his head with an axe, and nearly struck him. The master went home, and told C. that her temper could no longer be borne with, and she must go. He offered her the choice of being sold to a trader, and carried to New Orleans, or of being sent to field labour on a distant plantation. She preferred being sold to the trader; who broke his promise of taking her to New Orleans, and dis-

posed of her to a neighbouring proprietor. C. kept watch over her husband, declaring that she would be the death of any girl whom B. might take to wife. "And so," said my informant, "poor B. was obliged to walk about in single blessedness for some time; till, last summer, happily, C. died."—"Is it possible," said I, "that you pair and part these people like brutes?"—The lady looked surprised, and asked what else could be done.

One day at dinner, when two slaves were standing behind our chairs, the lady of the house was telling me a ludicrous story, in which a former slave of hers was one of the personages, serving as a butt on the question of complexion. She seemed to recollect that slaves were listening; for she put in, "D. was an excellent boy," (the term for male slaves of every age. "We respected him very highly as an excellent boy. We respected him almost as much as if he had been a white. But, &c.———"

A southern lady, of fair reputation for refinement and cultivation, told the following story in the hearing of a company, among whom were some friends of mine. She spoke with obvious unconsciousness that she was saying anything remarkable: indeed such unconsciousness was proved by her telling the story at all. She had possessed a very pretty mulatto girl, of whom she declared herself fond. A young man came to stay at her house, and fell in love with the girl. "She came to me," said the lady, "for protection; which I gave her." The young man went away, but after some weeks, returned, saying he was so much in love with the girl that he could not live without her. "I pitied the young man," concluded the lady; "so I sold the girl to him for 1,500 dollars."

I repeatedly heard the preaching of a remarkably liberal man, of a free and kindly spirit, in the south. His last sermon, extempore, was from the text "Cast all your care upon him, for He careth for you." The preacher told us, among other things, that God cares for all,—for the meanest as well as the mightiest. "He cares for that coloured person," said he, pointing to the gallery where the people of colour sit,—"he cares for that coloured person as well as for the wisest and best of you whites." This was the most wanton insult I had ever seen offered to a human being; and it was with difficulty that I refrained from walking out of the church. Yet no one present to whom I afterwards spoke of it seemed able to comprehend the wrong. "Well!" said they: "does not God care for the coloured people?"

Of course, in a society where things like these are said and done by its choicest members, there is a prevalent unconsciousness of the existing wrong. The daily and hourly plea is of good intentions towards the slaves; of innocence under the aspersions of foreigners. They are as sincere in the belief that they are injured as their visitors are cordial in their detestation of the morals of slavery. Such unconsciousness of the milder degrees of impurity and injustice as enables ladies and clergymen of the highest character to speak and act as I have related, is a sufficient evidence of the prevalent grossness of morals. One remarkable indication of such blindness was the almost universal mention of the state of the Irish to me, as a worse case than American slavery. I never attempted, of course, to vindicate the state of Ireland: but I was surprised to find no one able, till put in the way, to see the distinction between political misgovernment and personal slavery: between exasperating a people by political insult, and possessing them, like brutes, for pecuniary profit. The unconsciousness of guilt is the worst of symptoms, where there are means of light to be had. I shall have to speak hereafter of the state of religion throughout the country. It is enough here to say that if, with the law of liberty and the gospel of peace and purity within their hands, the inhabitants of the south are unconscious of the low state of the morals of society, such blindness proves nothing so much as how far that which is highest and purest may be confounded with what is lowest and foulest, when once the fatal attempt has been entered upon to make them co-exist. From their co-existence, one further step may be taken; and in the south has been taken; the making the high and pure a sanction for the low and foul. Of this, more hereafter.

The degradation of the women is so obvious a consequence of the evils disclosed above, that the painful subject need not be enlarged on. By the degradation of women, I do not mean to imply any doubt of the purity of their manners. There are reasons, plain enough to the observer, why their manners should be even peculiarly pure. They are all married young, from their being out-numbered by the other sex: and there is ever present an unfortunate servile class of their own sex to serve the purposes of licentiousness, so as to leave them untempted. Their degradation arises, not from their own conduct, but from that of all other parties about them. Where the generality of men carry secrets which their wives must be the last to know; where the busiest and more engrossing concerns of life must wear one aspect to the one

sex, and another to the other, there is an end to all wholesome confidence and sympathy, and woman sinks to be the ornament of her husband's house, the domestic manager of his establishment, instead of being his all-sufficient friend. I am speaking not only of what I suppose must necessarily be; but of what I have actually seen. I have seen, with heart-sorrow, the kind politeness, the gallantry, so insufficient to the loving heart, with which the wives of the south are treated by their husbands. I have seen the horror of a woman's having to work,—to exert the faculties which her Maker gave her;—the eagerness to ensure her unearned ease and rest; the deepest insult which can be offered to an intelligent and conscientious woman. I know the tone of conversation which is adopted towards women; different in its topics and its style from that which any man would dream of offering to any other man. I have heard the boast of the chivalrous consideration in which women are held throughout their woman's paradise; and seen something of the anguish of crushed pride, of the conflict of bitter feelings with which such boasts have been listened to by those whose aspirations teach them the hollowness of the system. The gentlemen are all the while unaware that women are not treated in the best possible manner among them: and they will remain thus blind as long as licentious intercourse with the lowest of the sex unfits them for appreciating the highest. Whenever their society shall take rank according to moral rather than physical considerations; whenever they shall rise to crave sympathy in the real objects of existence; whenever they shall begin to inquire what human life is, and wherefore, and to reverence it accordingly, they will humble themselves in shame for their abuse of the right of the strongest; for those very arrangements and observances which now constitute their boast. A lady who, brought up elsewhere to use her own faculties, and employ them on such objects as she thinks proper, and who has more knowledge and more wisdom than perhaps any gentleman of her acquaintance, told me of the disgust with which she submits to the conversation which is addressed to her, under the idea of being fit for her; and how she solaces herself at home, after such provocation, with the silent sympathy of books. A father of promising young daughters, whom he sees likely to be crushed by the system, told me, in a tone of voice which I shall never forget, that women there might as well be turned into the street, for anything they are fit for. There are reasonable hopes that his children may prove an exception. One gentleman who declares himself much interested in

the whole subject, expresses his horror of the employment of women in the northern States, for useful purposes. He told me that the same force of circumstances which, in the region he inhabits, makes men independent, increases the dependence of women, and will go on to increase it. Society is there, he declared, "always advancing towards orientalism." "There are but two ways in which woman can be exercised to the extent of her powers; by genius and by calamity, either of which may strengthen her to burst her conventional restraints. The first is too rare a circumstance to afford any basis for speculation: and may Heaven avert the last!" O, may Heaven hasten it! would be the cry of many hearts, if these be indeed the conditions of woman's fulfilling the purposes of her being. There are, I believe, some who would scarcely tremble to see their houses in flames, to hear the coming tornado, to feel the threatening earthquake, if these be indeed the messengers who must open their prison doors, and give their heaven-born spirits the range of the universe. God has given to them the universe, as to others: man has caged them in one corner of it, and dreads their escape from their cage, while man does that which he would not have woman hear of. He puts genius out of sight, and deprecates calamity. He has not, however, calculated all the forces in nature. If he had, he would hardly venture to hold either negroes or women as property, or to trust to the absence of genius and calamity.

One remarkable warning has been vouchsafed to him. A woman of strong mind, whose strenuous endeavours to soften the woes of slavery to her own dependents, failed to satisfy her conscience and relieve her human affections, had shaken the blood-slaked dust from her feet, and gone to live where every man can call himself his own: and not only to live, but to work there, and to pledge herself to death, if necessary, for the overthrow of the system which she abhors in proportion to her familiarity with it. Whether we are to call her Genius or Calamity, or by her own honoured name of Angelina Grimke, certain it is that she is rousing into life and energy many women who were unconscious of genius, and unvisited by calamity, but who carry honest and strong human hearts. This lady may ere long be found to have materially checked the "advance towards orientalism."

Of course, the children suffer, perhaps the most fatally of all, under the slave system. What can be expected from little boys who are brought up to consider physical courage the highest attribute of manhood; pride of section and of caste its loftiest grace; the slavery

of a part of society essential to the freedom of the rest; justice of less account than generosity; and humiliation in the eyes of men the most intolerable of evils? What is to be expected of little girls who boast of having got a negro flogged for being impertinent to them, and who are surprised at the "ungentlemanly" conduct of a master who maims his slave? Such lessons are not always taught expressly. Sometimes the reverse is expressly taught. But this is what the children in a slave country necessarily learn from what passes around them; just as the plainest girls in a school grow up to think personal beauty the most important of all endowments, in spite of daily assurances that the charms of the mind are all that are worth regarding.

The children of slave countries learn more and worse still. It is nearly impossible to keep them from close intercourse with the slaves; and the attempt is rarely made. The generality of slaves are as gross as the total absence of domestic sanctity might be expected to render them. They do not dream of any reserves with children. The consequences are inevitable. The woes of mothers from this cause are such that, if this "peculiar domestic institution" were confided to their charge, I believe they would accomplish its overthrow with an energy and wisdom that would look more like inspiration than orientalism. Among the incalculable forces in nature is the grief of mothers weeping for the corruption of their children.

One of the absolutely inevitable results of slavery is a disregard of human rights; an inability even to comprehend them. Probably the southern gentry, who declare that the presence of slavery enhances the love of freedom; that freedom can be duly estimated only where a particular class can appropriate all social privileges; that, to use the words of one of them, "they know too much of slavery to be slaves themselves," are sincere enough in such declarations; and if so, it follows that they do not know what freedom is. They may have the benefit of the alternative,—of not knowing what freedom is, and not being sincere. I am disposed to think that the first is the more common case.

One reason for my thinking so is, that I usually found in conversation in the south, that the idea of human rights was—sufficient subsistence in return for labour. This was assumed as the definition of human rights on which we were to argue the case of the slave. When I tried the definition by the golden rule, I found that even that straight, simple rule had become singularly bent in the hands of those who pro-

fess to acknowledge and apply it. A clergyman preached from the pulpit the following application of it, which is echoed unhesitatingly by the most religious of the slave-holders: "Treat your slaves as you would wish to be treated if you were a slave yourself." I verily believe that hundreds, or thousands, do not see that this is not an honest application of the rule; so blinded are they by custom to the fact that the negro is a man and brother.

Another of my reasons for supposing that the gentry of the South do not know what freedom is, is that many seem unconscious of the state of coercion in which they themselves are living; coercion not only from the incessant fear of which I have before spoken—a fear which haunts their homes, their business, and their recreations; coercion, not only from their fear, and from their being dependent for their hourly comforts upon the extinguished or estranged will of those whom they have injured; but coercion also from their own laws. The laws against the press are as peremptory as in the most despotic countries of Europe: as may be seen in the small number and size, and poor quality, of the newspapers of the South. I never saw, in the rawest villages of the youngest States, newspapers so empty and poor as those of New Orleans. It is curious that, while the subject of the abolition of slavery in the British colonies was necessarily a very interesting one throughout the southern States, I met with planters who did not know that any compensation had been paid by the British nation to the West Indian proprietors. The miserable quality of the southern newspapers, and the omission from them of the subjects on which the people most require information, will go far to account for the people's delusions on their own affairs, as compared with those of the rest of the world, and for their boasts of freedom, which probably arise from their knowing of none which is superior. They see how much more free they are than their own slaves; but are not generally aware what liberty is where all are free. In 1834 the number of newspapers was, in the State of New York, 267; in Louisiana, 31; in Massachusetts, 108; in South Carolina, 19; in Pennsylvania, 220; in Georgia, 29.

What is to be thought of the freedom of gentlemen subject to the following law? "Any person or persons who shall attempt to teach any free person of colour, or slave, to spell, read, or write, shall, upon conviction thereof by indictment, be fined in a sum not less than two hundred and fifty dollars, nor more than five hundred dollars."

What is to be thought of the freedom of gentlemen who cannot

emancipate their own slaves, except by the consent of the legislature; and then only under very strict conditions, which make the deed almost impracticable? It has been mentioned that during a temporary suspension of the laws against emancipation in Virginia, 10,000 slaves were freed in nine years; and that, as the institution seemed in peril, the masters were again coerced. It is pleaded that the masters themselves were the repealers and re-enactors of these laws. True: and thus it appears that they thought it necessary to deprive each other of a liberty which a great number seem to have made use of themselves, while they could. No high degree of liberty, or of the love of it, is to be seen here. The laws which forbid emancipation are felt to be cruelly galling, throughout the South. I heard frequent bitter complaints of them. They are the invariable plea urged by individuals to excuse their continuing to hold slaves. Such individuals are either sincere in these complaints, or they are not. If they are not, they must be under some deplorable coercion which compels so large a multitude to hypocrisy. If they are sincere, they possess the common republican means of getting tyrannical laws repealed: and why do they not use them? If these laws are felt to be oppressive, why is no voice heard denouncing them in the legislatures? If men complainingly, but voluntarily, submit to laws which bind the conscience, little can be said of their love of liberty. If they submit involuntarily, nothing can be said for their possession of it.

What, again, is to be thought of the freedom of citizens who are liable to lose caste because they follow conscience in a case where the perversity of the laws places interest on the side of conscience, and public opinion against it? I will explain. In a southern city I saw a gentleman who appeared to have all the outward requisites for commanding respect. He was very wealthy, had been governor of the State, and was an eminent and peculiar benefactor to the city. I found he did not stand well. As some pains were taken to impress me with this, I inquired the cause. His character was declared to be generally good. I soon got at the particular exception, which I was anxious to do only because I saw that it was somehow of public concern. While this gentleman was governor, there was an insurrection of slaves. His own slaves were accused. He did not believe them guilty, and refused to hang them. This was imputed to an unwillingness to sacrifice his property. He was thus in a predicament which no one can be placed in, except where man is held as property. He must either hang his

slaves, believing them innocent, and keep his character; or he must, by saving their lives, lose his own character. How the case stood with this gentleman, is fully known only to his own heart. His conduct claims the most candid construction. But, this being accorded as his due, what can be thought of the freedom of a republican thus circumstanced?

Passing over the perils, physical and moral, in which those are involved who live in a society where recklessness of life is treated with leniency, and physical courage stands high in the list of virtues and graces—perils which abridge a man's liberty of action and of speech in a way which would be felt to be intolerable if the restraint were not adorned by the false name of Honour—it is only necessary to look at the treatment of the abolitionists by the South, by both legislatures and individuals, to see that no practical understanding of liberty exists there.

Upon a mere vague report, or bare suspicion, persons traveling through the South have been arrested, imprisoned, and in some cases flogged or otherwise tortured, on pretense that such persons desired to cause insurrection among the slaves. More than one innocent person has been hanged; and the device of terrorism has been so practiced as to deprive the total number of persons who avowedly hold a certain set of opinions, of their constitutional liberty of traversing the whole country. It was declared by some liberal-minded gentlemen of South Carolina, after the publication of Dr. Channing's work on slavery, that if Dr. Channing were to enter South Carolina with a body-guard of 20,000 men, he could not come out alive. I have seen the lithographic prints, transmitted in letters to abolitionists, representing the individual to whom the letter was sent hanging on a gallows. I have seen the hand-bills, purporting to be issued by Committees of Vigilance, offering enormous rewards for the heads, or for the ears, of prominent abolitionists.

If it be said that these acts are attributable to the ignorant wrath of individuals only, it may be asked whence arose the Committees of Vigilance, which were last year sitting throughout the South and West, on the watch for any incautious person who might venture near them, with anti-slavery opinions in his mind? How came it that high official persons sat on these committees? How is it that some governors of southern States made formal application to governors of the northern States to procure the dispersion of anti-slavery societies, the repression of discussion, and the punishment of the promulgators of abolition

opinions? How is it that the governor of South Carolina last year recommended the summary execution, without benefit of clergy, of all persons caught within the limits of the State, holding avowed anti-slavery opinions; and that every sentiment of the governor's was indorsed by a select committee of the legislature?

All this proceeds from an ignorance of the first principles of liberty. It cannot be from a mere hypocritical disregard of such principles; for proud men, who boast a peculiar love of liberty and aptitude for it, would not voluntarily make themselves so ridiculous as they appear by these outrageous proceedings. Such blustering is so hopeless, and, if not sincere, so purposeless, that no other supposition is left than that they have lost sight of the fundamental principles of both their federal and State constitutions, and do now actually suppose that their own freedom lies in crushing all opposition to their own will. No pretense of evidence has been offered of any further offense against them than the expression of obnoxious opinions. There is no plea that any of their laws have been violated, except those recently enacted to annihilate freedom of speech and the press: laws which can in no case be binding upon persons out of the limits of the States for which these new laws are made.

The amended constitution of Virginia, of 1830, provides that the legislature shall not pass "any law abridging the freedom of speech or of the press." North and South Carolina and Georgia decree that the freedom of the press shall be preserved inviolate; the press being the grand bulwark of liberty. The constitution of Louisiana declares that "the free communication of thoughts and opinions is one of the invaluable rights of man; and every citizen may freely speak, write, and print, on any subject, being responsible for the abuse of that liberty." The Declaration of Rights of Mississippi declares that "no law shall ever be passed to curtail or restrain the liberty of speech, and of the press." The constitutions of all the slave States contain declarations and provisions like these. How fearfully have the descendants of those who framed them degenerated in their comprehension and practice of liberty, violating both the spirit and the letter of their original Bill of Rights! They are not yet fully aware of this. In the calmer times which are to come, they will perceive it, and look back with amazement upon the period of desperation, when not a voice was heard, even in the legislatures, to plead for human rights; when, for the sake of one doomed institution, they forgot what their fathers had done, fettered

their own presses, tied their own hands, robbed their fellow-citizens of their right of free traveling, and did all they could to deprive those same fellow-citizens of liberty and life, for the avowal and promulgation of opinions.

Meantime, it would be but decent to forbear all boasts of a superior knowledge and love of freedom.

Here I gladly break off my dark chapter on the Morals of Slavery.

GEORGE McDUFFIE

GEORGE McDUFFIE was born in Georgia, 1788. He graduated at South Carolina college. In 1814 he began the practice of law and four years later was sent to the South Carolina legislature. When a young man he favored a centralized government, but his sentiments changed with the development of the tariff and the slave questions, and while in Congress from 1821 to 1834 he fiercely opposed the "American Policy" of internal improvements and a protective tariff. He was one of the strongest defenders in the House of the Nullification doctrine. He was elected governor in 1835 and was a senator from 1843 to 1846, when he resigned on account of ill health.

He was one of the first to boldly advance the doctrine that slavery was a condition established by God, and the only one suitable to the negro race. His fierce hatred of abolitionists is shown in the address given below. He died in 1851.

THE RIGHTS OF SLAVERY
(1835)

Since your last adjournment the public mind throughout the slaveholding States has been intensely, indignantly and justly excited by the wanton, officious and incendiary proceedings of certain societies and persons in some of the non-slaveholding States, who have been actively employed in attempting to circulate among us pamphlets, papers and pictorial representations of the most offensive and inflammatory character, and eminently calculated to seduce our slaves from their fidelity,

and excite them to insurrection and massacre. These wicked monsters and deluded fanatics, overlooking the numerous objects in their own vicinity, who have a moral, if not a legal claim upon their charitable regard, run abroad, in the expansion of their hypocritical benevolence, muffled up in the saintly mantle of Christian meekness, to fulfill the fiend-like errand of mingling the blood of the master and the slave, to whose fate they are equally indifferent, with the smouldering ruins of our peaceful dwellings. No principle of human action so utterly baffles all human calculation as that species of fanatical enthusiasm, which is made of envy and ambition, assuming the guise of religious zeal, and acting upon the known prejudices, religious or political, of an ignorant multitude. Under the influence of this species of voluntary madness, nothing is sacred that stands in the way of its purposes. Like all other religious impostures, it has power to consecrate every act, however atrocious, and every person, however covered with "multiplying villainies," that may promote its diabolical ends, or worship at its infernal altars. By its unholy creed, murder itself becomes a labor of love and charity, and the felon *renegado,* who flies from the justice of his country, finds not only a refuge, but becomes a sainted minister, in the sanctuary of its temple. No error can be more mischievous than to underrate the danger of such a principle, and no policy can be more fatal than to neglect it, from a contempt for the supposed insignificance of its agents. The experience of both France and Great Britain fearfully instruct us, from what small and contemptible beginnings, this *ami des noirs* philanthropy may rise to a gigantic power, too mighty to be resisted by all the influence and energy of the government; in the one case, shrouding a wealthy and flourishing island in the blood of its white inhabitants; in the other, literally driving the ministry, by means of an instructed parliament, to perpetrate that act of suicidal legislation, and colonial oppression, the emancipation of slaves in the British West Indies. It may be not unaptly compared to the element of fire, of which, a neglected spark, amongst combustible materials, which a timely stamp of the foot might have extinguished forever, speedily swells into a sweeping torrent of fiery desolation, which no human power can arrest or control. In the opinion of the intelligent West India planters, it is because the local authorities, from a sense of false security neglected to hang up the first of these political missionaries that made their appearance on the British Islands, that they are doomed to barrenness and desertion, and to be the wretched abodes of indolent

and profligate blacks, exhibiting, in their squalid poverty, gross immorality and slavish subjection to an iron despotism of British bayonets, the fatal mockery of all the promised blessings of emancipation.

Under these circumstances, and in this critical conjuncture of our affairs, the solemn and responsible duty devolves on the legislature, of "taking care that the republic receive no detriment."

The crime which these foreign incendiaries have committed against the peace of the State, is one of the very highest grade known to human laws. It not only strikes at the very existence of society, but seeks to accomplish the catastrophe, by the most horrible means, celebrating the obsequies of the State in a saturnial carnival of blood and murder, and while brutally violating all the charities of life, and desecrating the very altars of religion, impiously calling upon Heaven to sanction these abominations. It is my deliberate opinion that the laws of every community should punish this species of interference by death without benefit of clergy, regarding the authors of it as "enemies of the human race." Nothing could be more appropriate than for South Carolina to set this example in the present crisis, and I trust the legislature will not adjourn till it discharges this high duty of patriotism.

It cannot be disguised, however, that any laws which may be enacted by the authority of this State, however adequate to punish and repress offenses committed within its limits, will be wholly insufficient to meet the exigencies of the present conjuncture. If we go no farther than this, we had as well do nothing.

The outrages against the peace and safety of the State are perpetrated in other communities, which hold and exercise sovereign and exclusive jurisdiction over all persons and things within their territorial limits. It is within these limits, protected from responsibility to our laws by the sovereignty of the States in which they reside, that the authors of all this mischief, securely concoct their schemes, plant their batteries, and hurl their fiery missiles among us, aimed at that mighty magazine of combustible matter, the explosion of which would lay the State in ruins.

It will, therefore, become our imperious duty, recurring to those great principles of international law, which still exist in all their primitive force amongst the sovereign States of this confederacy, to demand of our sovereign associates the condign punishment of those enemies of our peace, who avail themselves of the sanctuaries of their respective jurisdictions, to carry on schemes of incendiary hostility against the

institutions, the safety, and the existence of the State. In performing this high duty, to which we are constrained by the great law of self-preservation, let us approach to our co-States with all the fraternal mildness which becomes us as members of the same family of confederated republics, and at the same time with that firmness and decision, which becomes a sovereign State, while maintaining her dearest interests and most sacred rights.

For the institution of domestic slavery we hold ourselves responsible only to God, and it is utterly incompatible with the dignity and the safety of the State, to permit any foreign authority to question our right to maintain it. It may nevertheless be appropriate, as a voluntary token of our respect for the opinions of our confederate brethren, to present some views to their consideration on this subject, calculated to disabuse their minds of false opinions and pernicious prejudices.

No human institution, in my opinion, is more manifestly consistent with the will of God, than domestic slavery, and no one of His ordinances is written in more legible characters than that which consigns the African race to this condition, as more conducive to their own happiness, than any other of which they are susceptible. Whether we consult the sacred Scriptures, or the lights of nature and reason, we shall find these truths as abundantly apparent as if written with a sunbeam in the heavens. Under both the Jewish and Christian dispensations of our religion, domestic slavery existed with the unequivocal sanction of its prophets, its apostles, and finally its great Author. The patriarchs themselves, those chosen instruments of God, were slave-holders. In fact the divine sanction of this institution is so plainly written that "he who runs may read" it, and those over-righteous pretenders and Pharisees, who affect to be scandalized by its existence among us, would do well to inquire how much more nearly they walk in the ways of Godliness, than did Abraham, Isaac and Jacob. That the African negro is destined by Providence to occupy this condition of servile dependence, is not less manifest. It is marked on the face, stamped on the skin, and evinced by the intellectual inferiority and natural improvidence of this race. They have all the qualities that fit them for slaves, and not one of those that would fit them to be freemen. They are utterly unqualified not only for rational freedom, but for self-government of any kind. They are in all respects, physical, moral, and political, inferior to millions of the human race, who have for consecutive ages dragged out a wretched existence under a grinding political despotism, and

who are doomed to this hopeless condition by the very qualities which unfit them for a better. It is utterly astonishing that any enlightened American, after contemplating all the manifold forms in which even the white race of mankind are doomed to slavery and oppression, should suppose it possible to reclaim the African race from their destiny. The capacity to enjoy freedom is an attribute not to be communicated by human power. It is an endowment of God, and one of the rarest which it has pleased His inscrutable wisdom to bestow upon the nations of the earth. It is conferred as the reward of merit, and only upon those who are qualified to enjoy it. Until the "Ethiopian can change his skin," it will be in vain to attempt, by any human power, to make freemen of those whom God has doomed to be slaves, by all their attributes.

Let not, therefore, the misguided and designing intermeddlers who seek to destroy our peace, imagine that they are serving the cause of God by practically arraigning the decrees of His Providence. Indeed it would scarcely excite surprise, if with the impious audacity of those who projected the tower of Babel, they should attempt to scale the battlements of Heaven, and remonstrate with the God of wisdom for having put the mark of Cain and the curse of Ham upon the African race, instead of the European.

If the benevolent friends of the black race would compare the condition of that portion of them which we hold in servitude, with that which still remains in Africa, totally unblessed by the lights of civilization or Christianity, and groaning under a savage despotism, as utterly destitute of hope as of happiness, they would be able to form some tolerable estimate of what our blacks have lost by slavery in America, and what they have gained by freedom in Africa. Greatly as their condition has been improved by their subjection to an enlightened and Christian people (the only mode under heaven by which it could have been accomplished), they are yet wholly unprepared for anything like a rational system of self-government. Emancipation would be a positive curse, depriving them of a guardianship essential to their happiness, and they may well say in the language of the Spanish proverb, "Save us from our friends and we will take care of our enemies." If emancipated, where would they live, and what would be their condition? The idea of their remaining among us is utterly visionary. Amalgamation is abhorrent to every sentiment of nature; and if they remain as a separate caste, whether endowed with equal privileges or

not, they will become our masters or we must resume our mastery over them. This state of political amalgamation and conflict, which the abolitionists evidently aim to produce, would be the most horrible condition imaginable, and would furnish Dante or Milton with the type for another chapter illustrating the horrors of the infernal regions. The only disposition, therefore, that could be made of our emancipated slaves would be their transportation to Africa, to exterminate the natives or be exterminated by them; contingencies, either of which may well serve to illustrate the wisdom, if not the philanthropy of these superserviceable madmen, who in the name of humanity would desolate the fairest region of the earth and destroy the most perfect system of social and political happiness that ever has existed.

It is perfectly evident that the destiny of the Negro race is either the worst possible form of political slavery, or else domestic servitude as it exists in the slave-holding States. The advantage of domestic slavery over the most favorable conditions of political slavery, does not admit of a question. It is the obvious interest of the master, not less than his duty, to provide comfortable food and clothing for his slaves; and whatever false and exaggerated stories may be propagated by mercenary travelers, who make a trade of exchanging calumny for hospitality, the peasantry and operatives in no country of the world are better provided for, in these respects, than the slaves of our country. In the single empire of Great Britain, the most free and enlightened nation in Europe, there are more wretched paupers and half-starving operatives than there are negro slaves in the United States. In all respects, the comforts of our slaves are greatly superior to those of the English operatives, or the Irish and continental peasantry, to say nothing of the millions of paupers crowded together in those loathsome receptacles of starving humanity, the public poor-houses. Besides the hardships of incessant toil, too much almost for human nature to endure, and the sufferings of actual want, driving them almost to despair, these miserable creatures are perpetually annoyed by the most distressing cares for the future condition of themselves and their children.

From this excess of labor, this actual want, and these distressing cares, our slaves are entirely exempted. They habitually labor from two to four hours a day less than the operatives in other countries, and it has been truly remarked, by some writer, that a negro cannot be made to injure himself by excessive labor. It may be safely affirmed that they eat as much wholesome and substantial food in one day as English

operatives or Irish peasants eat in two. And as it regards concern for the future, their condition may well be envied even by their masters. There is not upon the face of the earth, any class of people, high or low, so perfectly free from care and anxiety. They know that their masters will provide for them under all circumstances, and that in the extremity of old age, instead of being driven to beggary, or to seek public charity in a poor-house, they will be comfortably accommodated and kindly treated among their relatives and associates. Cato the elder has been regarded as a model of Roman virtue, and yet he is said to have sold his superannuated slaves to avoid the expense of maintaining them. The citizens of this State may not aspire to rival the virtue of the Romans, but it may be safely affirmed that they would doom to execration the master who should imitate the inhuman example of the Roman paragon. The government of our slaves is strictly patriarchal, and produces those mutual feelings of kindness which result from a constant interchange of good offices, and which can only exist in a system of domestic or patriarchal slavery. They are entirely unknown either in a state of political slavery, or in that form of domestic servitude which exists in all other communities.

In a word, our slaves are cheerful, contented and happy, much beyond the general condition of the human race, except where those foreign intruders and fatal ministers of mischief, the emancipationists, like their arch-prototype in the Garden of Eden, and actuated by no less envy, have tempted them to aspire above the condition to which they have been assigned in the order of Providence.

Nor can it be admitted, as some of our own statesmen have affirmed in a mischievous and misguided spirit of sickly sentimentality, that our system of domestic slavery is a curse to the white population—a moral and political evil much to be deplored, but incapable of being eradicated. Let the tree be judged by its fruit. More than half a century ago, one of the most enlightened statesmen who ever illustrated the parliamentary annals of Great Britain, looking into political causes, with an eye of profound philosophy, ascribed the high and indomitable spirit of liberty which distinguished the Southern colonies, to the existence of domestic slavery; referring to the example of the free States of antiquity as a confirmation of his theory. Since those colonies have become independent States, they have amply sustained the glory of their primitive character. There is no coloring of national vanity in the assertion, which impartial history will ratify, that the principles of

rational liberty are not less thoroughly understood, and have been more vigilantly, resolutely and effectively defended against all the encroachments of power, by the slave-holding States, than by any other members of the confederacy. In which of our great political conflicts is it, that they have not been found arrayed against every form of usurpation, and fighting under the flag of liberty? Indeed it is a fact of historical notoriety that those great Whig principles of liberty, by which government is restrained within constitutional limits, have had their origin, and for a long time have had their abiding place, in the slave-holding States.

Reason and philosophy can easily explain what experience so clearly testifies. If we look into the elements of which all political communities are composed, it will be found that servitude, in some form, is one of the essential constituents. No community ever has existed without it, and we may confidently assert, none ever will. In the very nature of things there must be classes of persons to discharge all the different offices of society, from the highest to the lowest. Some of those offices are regarded as degrading, though they must and will be performed. Hence those manifold forms of dependent servitude which produce a sense of superiority in the masters or employers, and of inferiority on the part of the servants. Where these offices are performed by members of the political community, a dangerous element is introduced into the body politic. Hence the alarming tendency to violate the rights of property by agrarian legislation, which is beginning to be manifest in the older States, where universal suffrage prevails without domestic slavery, a tendency that will increase in the progress of society with the increasing inequality of wealth. No government is worthy of the name that does not protect the rights of property, and no enlightened people will long submit to such a mockery. Hence it is that in older countries, different political orders are established to effect this indispensable object, and it will be fortunate for the non-slaveholding States if they are not in less than a quarter of a century driven to the adoption of a similar institution, or to take refuge from robbery and anarchy under a military despotism. But where the menial offices and dependent employments of society are performed by domestic slaves, a class well defined by their color and entirely separated from the political body, the rights of property are perfectly secure, without the establishment of artificial barriers. In a word, the institution of domestic slavery supersedes the necessity of an order of nobility, and all the other

appendages of a hereditary system of government. If our slaves were emancipated, and admitted, bleached or unbleached, to an equal participation in our political privileges, what a commentary should we furnish upon the doctrines of the emancipationists, and what a revolting spectacle of republican equality should we exhibit to the mockery of the world! No rational man would consent to live in such a state of society, if he could find a refuge in any other.

Domestic slavery, therefore, instead of being a political evil, is the corner-stone of our republican edifice. No patriot who justly estimates our privileges will tolerate the idea of emancipation at any period, however remote, or on any conditions of pecuniary advantage, however favorable. I would as soon open a negotiation for selling the liberty of the State at once, as for making any stipulations for the ultimate emancipation of our slaves. So deep is my conviction on this subject, that if I were doomed to die immediately after recording these sentiments, I could say in all sincerity and under all the sanctions of Christianity and patriotism, "God forbid that my descendants, in the remotest generations, should live in any other than a community having the institution of domestic slavery, as it existed among the patriarchs of the primitive church and in all the free states of antiquity."

If the legislature should concur in these general views of this important element of our political and social system, our confederates should be distinctly informed, in any communications we may have occasion to make to them, that in claiming to be exempted from all foreign interference, we can recognize no distinction between ultimate and immediate emancipation.

It becomes necessary, in order to ascertain the extent of our danger, and the measures of precaution necessary to guard against it, that we examine into the real motives and ultimate purposes of the Abolition Societies, and their prominent agents. To justify their officious and gratuitous interference in our domestic affairs—the most insulting and insolent outrage which can be offered to a community—they profess to hold themselves responsible for the pretended sin of our domestic slavery, because, forsooth, they tolerate its existence among us. If they are at all responsible for the sin of slavery, whatever that may be, it is not because they tolerate it now, but because their ancestors were the agents and authors of its original introduction. These ancestors sold ours the slaves and warranted the title, and it would be a much more becoming labor of filial piety for their descendants to pray for their

souls, if they are Protestants, and buy masses to redeem them from purgatory, if they are Catholics, than to assail their warranty and slander their memory by denouncing them as "man-stealers and murderers." But this voluntary and gratuitous assumption of responsibility, in imitation of a recent and high example in our history, but imperfectly conceals a lurking principle of danger, which deserves to be examined and exposed. What is there to make the people of New York or Massachusetts responsible for slavery in South Carolina, any more than the people of Great Britain? To assume that the people of those States are responsible for the continuance of this institution, is distinctly to assume that they have a right to abolish it. And whatever enforced disclaimers they may make, their efforts would be worse than unprofitable on any other hypothesis. The folly of attempting to convert the slave-holders to voluntary emancipation, by a course of slander and denunciation, is too great to be ascribed even to fanaticism itself. They do not, indeed, disguise the fact that their principal object is to operate on public opinion in the non-slaveholding States. And to what purpose? They cannot suppose that the opinion of those States, however unanimous, can break the chains of slavery by some moral magic. The whole tenor of their conduct and temper of their discussions clearly demonstrate that their object is to bring the slave-holding States into universal odium, and the public opinion of the non-slaveholding to the point of emancipating our slaves by federal legislation, without the consent of their owners. Disguise it as they may, "to this complexion it must come at last."

It is in this aspect of the subject that it challenges our grave and solemn consideration. It behooves us then, in my opinion, to demand, respectfully, of each and every one of the slave-holding States:

1. A formal and solemn disclaimer, by its legislature, of the existence of any rightful power, either in such State or the United States, in Congress assembled, to interfere in any manner whatever with the institution of domestic slavery in South Carolina.

2. The immediate passage of penal laws by such legislature, denouncing against the incendiaries of whom we complain, such punishments as will speedily and forever suppress their machinations against our peace and safety. Though the right to emancipate our slaves by coercive legislation has been very generally disclaimed by popular assemblages in the non-slaveholding States, it is nevertheless important that each of those States should give this disclaimer and the

authentic and authoritative form of a legislative declaration, to be preserved as a permanent record for our future security. Our right to demand of those States the enactment of laws for the punishment of those enemies of our peace, who avail themselves of the sanctuary of their sovereign jurisdiction to wage a war of extermination against us, is founded on one of the most salutary and conservative principles of international law. Every State is under the most sacred obligations, not only to abstain from all such interference with the institutions of another as is calculated to disturb its tranquility or endanger its safety; but to prevent its citizens or subjects from such interference, either by inflicting condign punishment itself, or by delivering them up to the justice of the offending community. As between separate and independent nations, the refusal of a State to punish these offensive proceedings against another, by its citizens or subjects, makes the State so refusing an accomplice in the outrage, and furnishes a just cause of war. These principles of international law are universally admitted, and none have been more sacredly observed by just and enlightened nations. The obligations of the non-slaveholding States to punish and repress the proceedings of their citizens against our domestic institutions and tranquility are greatly increased, both by the nature of those proceedings and the fraternal relation which subsists between the States of this confederacy. For no outrage against any community can be greater than to stir up the elements of servile insurrection, and no obligation to repress it can be more sacred than that which adds to the sanctions of international law, the solemn guarantee of a constitutional compact, which is at once the bond and the condition of our union. The liberal, enlightened and magnanimous conduct of the people in many portions of the non-slaveholding States forbids us to anticipate a refusal on the part of those States to fulfill these high obligations of national faith and duty. And we have the less reason to look forward to this inauspicious result, from considering the necessary consequences which would follow to the people of those States and of the whole commercial world, from the general emancipation of our slaves. These consequences may be presented as an irresistible appeal to every rational philanthropist in Europe or America. It is clearly demonstrable that the production of cotton depends not so much on soil and climate, as on the existence of domestic slavery. In the relaxing latitudes where it grows, not one-half the quantity would be produced but for the existence of this institution, and every practical planter will concur in the

opinion that, if all the slaves in these States were now emancipated, the American crop would be reduced the very next year from 1,200,000 to 600,000 bales. No great skill in political economy will be required to estimate how enormously the price of cotton would be increased by this change, and no one who will consider how largely this staple contributes to the wealth of manufacturing nations, and to the necessaries and comforts of the poorer classes all over the world, can fail to perceive the disastrous effects of so great a reduction in the quantity and so great an enhancement in the price of it. In Great Britain, France and the United States, the catastrophe would be overwhelming, and it is not extravagant to say that for little more than two millions of negro slaves, cut loose from their tranquil moorings, and set adrift upon the untried ocean, of at least a doubtful experiment, ten millions of poor white people would be reduced to destitution, pauperism and starvation. An anxious desire to avoid the last sad alternative of an injured community prompts this final appeal to the interests and enlightened philanthropy of our Confederate States. And we cannot permit ourselves to believe that our just demands, thus supported by every consideration of humanity and duty, will be rejected by States who are united to us by so many social and political ties, and who have so deep an interest in the preservation of that union.

WILLIAM LLOYD GARRISON

William Lloyd Garrison was born at Newburyport, Massachusetts, December 10, 1805. His father died when he was a child, and his mother could give him only a meagre education. In 1818 he was apprenticed to a printer and soon became contributor to the paper. He became interested in the appeals of Benjamin Lundy against slavery, and when Lundy walked through the snow from Boston to Bennington (125 miles) in order to ask Garrison to help him edit "The Genius of Universal Emancipation," Garrison consented. Lundy favored gradual emancipation and a colonization in Africa of the freed negroes; Garrison struck out boldly for immediate emancipation and against any colonization scheme; but the two printed their articles in the same paper

over their individual signatures. Garrison attacked slavery as not merely an inherited evil, but a present living sin.

In 1830 Garrison was fined $50 and costs for denouncing the carrying of a cargo of slaves from Baltimore to New Orleans as "domestic piracy," and being unable to pay was sent to jail.

On January 1, 1831, together with Isaac Knapp he published in Boston the first number of "The Liberator." They had not a dollar of capital and had to sleep on the floor of the room, but the paper soon made a stir throughout the whole country. The "New England Anti-Slavery Society" was formed in 1832. In 1835 he was dragged through the streets of Boston by a mob sympathizing with slavery.

The second step in the abolition movement was made in 1842, when Garrison denounced the Constitution as a "covenant with death and an agreement with hell" and clamored for "No union with slaveholders." The abolitionists divided upon this question, and the radical wing led by Garrison became hated by lovers of the Union in the North as well as in the South. Yet it was through him and Wendell Phillips more than anyone else that slavery came to be considered not merely an evil but a sin, and that the North became aroused to oppose its extension.

Garrison was, of course, not a Republican, but when the war came he saw that it meant the extinction of slavery, and though he had cried out for Northern secession, lent his aid against secession by the South.

He died May 24, 1879.

THE LIBERATOR

To the Public

In the month of August I issued proposals for publishing "The Liberator" in Washington City; but the enterprise, though hailed in different sections of the country, was palsied by public indifference. Since that time the removal of the Genius of Universal Emancipation to the seat of government has rendered less imperious the establishment of a similar periodical in that quarter.

During my recent tour for the purpose of exciting the minds of the people by a series of discourses on the subject of slavery, every place that I visited gave fresh evidence of the fact that a greater revolution in public sentiment was to be effected in the free States—and particularly in New England—than at the South. I found contempt more

bitter, opposition more active, detraction more relentless, prejudice more stubborn, and apathy more frozen, than among the slave-owners themselves. Of course, there were individual exceptions to the contrary. This state of things afflicted, but did not dishearten me. I determined, at every hazard, to lift up the standard of emancipation in the eyes of the nation, within sight of Bunker Hill and in the birthplace of liberty. That standard is now unfurled; and long may it float, unhurt by the spoliations of time or the missiles of a desperate foe—yea, till every chain be broken, and every bondman be set free! Let Southern oppressors tremble—let their secret abettors tremble—let their Northern apologists tremble—let all the enemies of the persecuted blacks tremble!

I deem the publication of my original Prospectus unnecessary, as it has obtained a wide circulation. The principles therein inculcated will be steadily pursued in this paper, excepting that I shall not array myself as the political partisan of any man. In defending the great cause of human rights, I wish to derive the assistance of all religions and of all parties.

Assenting to the "self-evident truth" maintained in the American Declaration of Independence, "that all men are created equal, and endowed by their Creator with certain inalienable rights—among which are life, liberty and the pursuit of happiness," I shall strenuously contend for the immediate enfranchisement of our slave population. In Park Street Church, on the Fourth of July, 1829, in an address on slavery, I unreflectingly assented to the popular but pernicious doctrine of gradual abolition. I seize this opportunity to make a full and unequivocal recantation, and thus publicly to ask pardon of my God, of my country, and of my brethren the poor slaves, for having uttered a sentiment so full of timidity, injustice, and absurdity. A similar recantation, from my pen, was published in the Genius of Universal Emancipation at Baltimore, in September, 1829. My conscience is now satisfied.

I am aware that many object to the severity of my language; but is there not cause for severity? I will be as harsh as truth, and as uncompromising as justice. On this subject I do not wish to think, or speak, or write, with moderation. No! no! Tell a man whose house is on fire to give a moderate alarm; tell him to moderately rescue his wife from the hands of the ravisher; tell the mother to gradually extricate her babe from the fire into which it has fallen; but urge me not to use

moderation in a cause like the present. I am in earnest—I will not equivocate—I will not excuse—I will not retreat a single inch—and I will be heard. The apathy of the people is enough to make every statue leap from its pedestal, and to hasten the resurrection of the dead.

It is pretended that I am retarding the cause of emancipation by the coarseness of my invective and the precipitancy of my measures. The charge is not true. On this question my influence—humble as it is—is felt at this moment to a considerable extent, and shall be felt in coming years—not perniciously, but beneficially—not as a curse, but as a blessing; and posterity will bear testimony that I was right. I desire to thank God, that He enables me to disregard "the fear of man which bringeth a snare," and to speak His truth in its simplicity and power. And here I close with this fresh dedication:

"Oppression! I have seen thee, face to face,
And met thy cruel eye and cloudy brow;
But thy soul-withering glance I fear not now—
For dread to prouder feelings doth give place
Of deep abhorrence! Scorning the disgrace
Of slavish knees that at thy footstool bow,
I also kneel—but with far other vow
Do hail thee and thy herd of hirelings base:—
I swear, while life-blood warms my throbbing veins,
Still to oppose and thwart, with heart and hand,
Thy brutalizing sway—till Afric's chains
Are burst, and Freedom rules the rescued land,—
Trampling Oppression and his iron rod:
Such is the vow I take—so help me God!"

WILLIAM LLOYD GARRISON.

BOSTON, January 1, 1831.

THE CONSTITUTION A "COVENANT WITH DEATH AND AN AGREEMENT WITH HELL"

(Published in the "Liberator," XII, 71; 1842.)

We affirm that the Union is not of heaven. It is founded in unrighteousness, and cemented with blood. It is the work of men's hands, and they worship the idol which they have made. It is a horrible mockery of freedom. In all its parts and proportions it is misshapen, incongruous, unnatural. The message of the prophet to the people in

Jerusalem describes the exact character of our "republican" compact:

"Hear the word of the Lord, ye scornful men that rule this people. Because ye have said, We have made a covenant with death, and with Hell are we at agreement; when the overflowing scourge shall pass through, it shall not come unto us: for we have made lies our refuge, and under falsehood have we hid ourselves: Therefore thus saith the Lord God, Judgment will I lay to the line, and righteousness to the plummet: and the hail shall sweep away the refuge of lies, and the waters shall overflow the hiding-place. And your covenant with Death shall be annulled, and your agreement with Hell shall not stand; when the overflowing scourge shall pass through, then shall ye be trodden down by it."

Another message of the same inspired prophet is equally applicable:

"Thus saith the Holy One of Israel, Because ye despise this word, and trust in oppression and perverseness, and stay thereon: Therefore, this iniquity shall be to you as a breach ready to fall, swelling out in a high wall, whose breaking cometh suddenly, at an instant. And he shall break it as the breaking of a potter's vessel that is broken to pieces; he shall not spare: so that there shall not be found, in the bursting of it, a sherd to take fire from the hearth, or to take water withal out of the pit."

Slavery is a combination of Death and Hell, and with it the North have made a covenant and are at agreement. As an element of the government it is omnipotent, omniscient, omnipresent. As a component part of the Union, it is necessarily a national interest. Divorced from Northern protection, it dies; with that protection, it enlarges its boundaries, multiplies its victims, and extends its ravages.

NO UNION WITH SLAVEHOLDERS

(Submitted to the American Anti-Slavery Society, May, 1842. Printed in "Liberator," XII, 87.)

Whereas, the existence of slavery is incompatible with the enjoyment of liberty in any country;

And whereas, it is morally and politically impossible for a just or equal union to exist between liberty and slavery;

And whereas, in the adoption of the American Constitution and in the formation of the Federal government, a guilty and fatal compromise was made between the North and the South, by which slavery has been nourished, protected, and enlarged up to the present hour, to

the impoverishment and disgrace of the nation, the sacrifice of civil and religious freedom, and the crucifixion of humanity;

And whereas, the South makes even moral opposition to her slave system a heinous crime, and avows her determination to perpetuate that system at all hazards, and under all circumstances;

And whereas, the right of petition has been repeatedly cloven down on the floor of Congress, and is no longer enjoyed by the people of the free States—the liberty of speech and the press is not tolerated in one-half of the Union—and they who advocate the cause of universal emancipation are regarded and treated as outlaws by the South;

And whereas, by a recent decision of the Supreme Court of the United States, the right of trial by jury is denied to such of the people of the free States as shall be claimed as goods and chattels by Southern taskmasters, and slavery is declared to be the supreme law of the land; from which decision there is no appeal to any higher judicatory, except to the people on the ground of revolutionary necessity;

And whereas, to reverence justice, to cherish liberty, and to promote righteousness, are the primary duties of every people, from the performance of which they cannot innocently escape by any compact or for of government; therefore,

1. Resolved, That the consequences of doing right must ever be more safe and beneficial than those of doing wrong; and that the worst thing liberty can do is to unite with slavery, and the best thing is to withdraw from the embraces of the monster.

2. Resolved, That the American Union is, and ever has been since the adoption of the Constitution, a rope of sand (so far as the North is concerned), and a concentration of the physical force of the nation to destroy liberty and to uphold slavery.

3. Resolved, That the safety, prosperity, and perpetuity of the non-slaveholding States require that their connection be immediately dissolved with the slave States in form, as it is now in fact.

IN SUPPORT OF THE AMERICAN ANTI-SLAVERY SOCIETY

(Published in the "Liberator" XIV, 82; 1844.)

1. To the objection, that the action of the Society virtually does away with the rights of conscience of its members, and narrows the anti-slavery platform, we reply that this charge can be sustained only by showing that none are allowed to retain their membership in the Society excepting those who subscribe to the action alluded to. But no such test is required—the Constitution remains unaltered—the platform remains the same as hitherto—as a condition of membership, noth-

ing more is required than an assent to the doctrine, that slaveholding is a sin against God, and ought to be immediately abandoned; and, therefore, this objection falls to the ground. Is the Society to adopt only that course of action which shall at all times obtain a unanimous vote? Then it can make no progress, for its reformative power is lost. There may, there must, be unanimity of sentiment in regard to the principles of our enterprise; but in the application of those principles to existing religious and political institutions, similar unanimity is not to be expected nor required as a condition of membership—and the minority of this year may be the majority of the next.

2. It is objected, that it is the adoption of a creed. No more than the declaration that "the American churches are the bulwarks of slavery;" that the Whig and Democratic parties ought to be abandoned as pro-slavery; that no abolitionist can consistently support a pro-slavery clergyman, or continue in Christian fellowship with a pro-slavery church, or vote for Henry Clay or Martin Van Buren. No more than a thousand similar opinions which have been expressed, from time to time, by anti-slavery societies and at anti-slavery meetings, in all parts of the free States. Are these opinions to be stifled because all who belong to those societies, or who profess to be abolitionists, are not ready for their adoption? And because a majority feel bound to utter them, is it for the minority to complain that such utterance is a trespass on their rights of conscience? Have the majority no such rights? —and when they are called upon to suppress their convictions of duty, to gratify the minority, do not the latter interfere with the rights of conscience? Is not the argument "as broad as it is long?" But, the truth is, no proscription is implied or intended; nothing invidious is meant. The majority may err, and the minority may be in the right, in regard to particular propositions or modes of action; but this does not alter the platform on which both parties stand; and where there is honesty of purpose, in due season experience will prove whose views are most worthy of unanimous approval. Besides, what is the creed that is objected to? It is all summed up in a single sentence: "No union with slaveholders!" How would it read:—"Union with tyrants, for the preservation and extension of liberty!" What fellowship has light with darkness? and how can Christ and Belial belong to the same government, and co-operate together for the promotion of righteousness in the earth?

5. The minority "regard the proposition [of disunion] as impracticable." If the people of the United States are free agents, then what

they have done they can undo. They have "made a covenant with death"—that covenant they can abrogate. "With hell they are at agreement"—from it they can withdraw their countenance. The proposition may be, and really is, impracticable to those who feel unwilling or unable to support it; but not to those who hail it as eternal truth, as the true anti-slavery issue, as the ground of safety and success—and who, by their deeds, are resolved to show that it is a duty which can be easily performed in the strength of conscious rectitude. The objection that it is "impracticable" may only mean that, in the opinion of the protestants, no considerable portion of the people can ever be persuaded to adopt it. We conceive that our obligation to do a righteous act is not at all dependent on the question whether we shall succeed in carrying the multitude with us. Of one thing we are sure, that we may not innocently go with them to do evil. Broad is the road that leads to death, and many there be that walk therein. Some of our friends who look on this revolutionary step as "impracticable" were as strongly persuaded, at the formation of the New England Anti-Slavery Society, that the doctrine of immediate and unconditional emancipation was futile, "intolerant, and presumptuous;" but they were not long in discovering their mistake, and they rectified it with penitent and grateful hearts. So we trust it will prove in the present case. When the doctrine of teetotalism was first advocated, to all but a clear-sighted, adventurous few it seemed utterly chimerical. How is it now regarded? Now, it seems to us that the doctrines referred to are not more consonant with reason and duty than that which requires freemen to have "no union with slaveholders."

6. The protestants "regard the proposition as calculated to impair the character and influence of the Society." The American Anti-Slavery Society has never had any character, except for fanaticism; and never can have any, safely, until the trumpet of jubilee sounds throughout the land. Our prophecy is, that while the new position which it has assumed will subject the Society to fresh contumely and derision, for a time, posterity will regard it with special admiration and gratitude; and universal tyranny shall feel it as a blow struck by the hand of omnipotence. The "influence" of the Society has been just in proportion to its faith in God, its fidelity to its principles, its readiness to be without reputation. We believe it now occupies the highest defensible ground against the enemy.

7. It is objected that this is "precisely the course which all the

crafty advocates of slavery would wish us to pursue." This is an empty assertion—and the facts that have already transpired prove it to be equally fallacious. What rage and consternation were excited in Congress on the presentation of the famous Haverhill petition for a peaceful dissolution of the Union! How did "the crafty advocates of slavery" gnaw their tongues for pain, and cry out, as did kindred spirits of old, that they were tormented before their time! How did it extort the confession from the lips of southern Senators and Representatives, that a dissolution of the Union would be a dissolution of slavery! How effectually has it silenced southern bluster, and humbled southern audacity, in regard to a separation! And now that the American Anti-Slavery Society calls for secession—now that a host of the foremost and most unflinching advocates of emancipation are ready to sound the tocsin of disunion—now that the motto on the anti-slavery banner is, "No union with slaveholders!"—is it to be credited that they who quailed before the solitary petition from Haverhill, signed by some thirty individuals, will now rejoice and take courage? "O, most lame and impotent conclusion!" But let time determine this.

9. It is "in opposition to the evident doctrine of the constitution of the Society." But that constitution provides for the use of all moral and legal means for the overthrow of slavery; and these are embodied in the doctrine of secession from the government.

11. It is urged that the ground of disunion "is an attack upon the conscientious convictions of the minority, of the same character as that which is said to have been formerly attempted by new organizationists, but repudiated by this Society—they having proposed to decide that it was the moral duty of every abolitionist in the country to go to the polls and vote for public officers, and the present measure being a decision that it is the duty of all abolitionists to abstain from such voting." Here we have a comparison of cases, but there is no analogy between them. The fact is that, though James G. Birney and a few others advocated the moral duty of voting, the question was never presented to the American A. S. Society for its consideration. The division in 1840 took place in consequence of Abby Kelley being placed on a business committee, and the refusal of the Society to put a padlock on the lips of any of its members who might feel moved to speak in behalf of "the suffering and the dumb." Besides, the ground assumed by Birney and his abettors was, not simply that voting was an anti-slavery duty, but that it should be recognized as a religious obli-

gation at all times, and this bloody and atheistical government as having a divine origin and approval! This creed they wanted abolitionists to swallow before they should be allowed to occupy the anti-slavery platform as those in "regular standing." It was justly regarded by the bone and muscle of our enterprise as a proscriptive and unjustifiable measure, resorted to evidently for an evil purpose, and urged out of no regard for the onward march of emancipation, as the sequel has fully proved. It is now charged, as an equally heinous offense, that the Society has decided "that it is the duty of all abolitionists to abstain from voting." True—voting to sustain a blood-cemented Union and a pro-slavery Constitution—but not true in regard to the abstract question of voting, or of the form of government which is in harmony with the will of God and the freedom of the human mind. A wide difference.

13. It is argued that "if voting under the Constitution be a criminal participation in slavery, the paying of taxes under it is equally so." Without stopping to show that there is a fallacy in this argument, we reply that, in the common use and understanding of the terms, no seceder will ever again pay taxes to the government while it upholds slavery. He may consent peaceably to yield up what is demanded of him, but not without remonstrance, and only as he would give up his purse to a highwayman. He will not recognize it as a lawful tax—he will not pay it as a tax—but will denounce it as robbery and oppression.

17. The last objection urged by the protestants is, that "it proposes to dissolve the American Union, and our membership of it, before having petitioned for a change of the objectionable features of the American Constitution." Of what avail is it to petition when the right of petition is denied and trampled in the dust? What is it but to mock us to say, when we are treated as outlaws, and slavery reigns over the land, that we have not gone through certain worthless forms before declaring that we will not any longer "walk in the counsel of the ungodly, nor stand in the way of sinners, nor sit in the seat of the scornful?" It is enough that the government is powerless to protect us—nay, that it gives us up to destruction—nay, more, that it keeps in chains, as beasts of burden, three millions of the people. As the angels said to Lot, "Escape for thy life!—look not behind thee, neither stay thou in all the plain: escape to the mountain, lest thou be consumed!"—so are we to "come out" and be separate, in the spirit of heavenly allegiance exclaiming, "O Lord our God, other lords beside Thee have had dominion over us; but by Thee only will we make

mention of Thy name." How applicable the language of Isaiah to the present emergency!—"For the Lord spake thus to me with a strong hand, and instructed me that I should not walk in the way of this people, saying, Say ye not, A confederacy, to all them to whom this people shall say, A confederacy; neither fear ye their fear, nor be afraid. Sanctify the Lord of hosts Himself; and let Him be your fear, and let Him be your dread; and He shall be for a sanctuary!"

We have thus examined every objection brought by the protestants against the action of the parent Society, as far as our narrow limits will permit—with what success, our readers must decide. The more we weigh this matter, the stronger grows our conviction that the true issue is now made, that abolitionists should take a revolutionary position, and that the watchword in our ranks should be, "No union with slaveholders!"

WENDELL PHILLIPS

Wendell Phillips was born in Boston November 29, 1811. He was the son of John Phillips, the first mayor of Boston. He graduated from Harvard in 1831, and was admitted to the bar in 1834.

In 1835 Garrison was dragged by a mob through the streets of Boston and Phillips' disbelief in slavery was greatly strengthened by this repression of free speech. In 1837 the editor Lovejoy was killed by a mob at Alton, Ill. At a meeting held in Boston to condemn the act, the mob was strongly upheld by the state's attorney and many of those present. Phillips leaped to his feet and delivered the famous reply given below. From this time he was the great orator of the Abolitionists. It cost him his social position, but he persevered. He followed Garrison in his denouncement of the Constitution, and gave up his diploma as a lawyer because he could not support it.

He delivered many speeches in favor of abolition, and his great lecture on Toussaint L'Ouverture was delivered many times. Taken all in all, he deserves to rank with Webster as an orator. His diction is even simpler and his thought more forcible than Lincoln's, and oratory to-day takes these results rather than the Ciceronian periods of the eighteenth century as its aim.

Phillips supported the North in the Civil War, because, like Garrison, he saw that it meant the extinction of slavery.

Later in life he advocated woman's rights and prohibition.

He died February 2, 1884.

THE MURDER OF LOVEJOY

MR. CHAIRMAN:—We have met for the freest discussion of these resolutions and the events which gave rise to them. [Cries of "Question," "Hear him," "Go on," "No gagging," etc.] I hope I shall be permitted to express my surprise at the sentiments of the last speaker—surprise not only at such sentiments from such a man, but at the applause they have received within these walls. A comparison has been drawn between the events of the Revolution and the tragedy at Alton. We have heard it asserted here in Faneuil Hall that Great Britain had a right to tax the Colonies, and we have heard the mob at Alton, the drunken murderers of Lovejoy, compared to those patriot fathers who threw the tea overboard! [Great applause]. Fellow-citizens, is this Faneuil Hall doctrine? ["No, no."] The mob at Alton were met to wrest from a citizen his just rights—met to resist the laws. We have been told that our fathers did the same; and the glorious mantle of Revolutionary precedent has been thrown over the mobs of our day. To make out their title to such defense, the gentleman says that the British Parliament had a right to tax these Colonies. It is manifest that, without this, his parallel falls to the ground; for Lovejoy had stationed himself within constitutional bulwarks. He was not only defending the freedom of the press, but he was under his own roof, in arms with the sanction of the civil authority. The men who assailed him went against and over the laws. The mob, as the gentleman terms it—mob, forsooth! certainly we sons of the tea-spillers are a marvelously patient generation!—the "orderly mob" which assembled in the Old South to destroy the tea were met to resist, not the laws, but illegal exactions. Shame on the American who calls the tea-tax and stamp-act laws! Our fathers resisted, not the king's prerogative, but the king's usurpation. To find any other account you must read our Revolutionary history upside down. Our State archives are loaded with arguments of John Adams to prove the taxes laid by the British Parliament unconstitutional—beyond its power. It was not till this was made out that the men of

New England rushed to arms. The arguments of the Council Chamber and the House of Representatives preceded and sanctioned the contest. To draw the conduct of our ancestors into a precedent for mobs, for a right to resist laws we ourselves have enacted, is an insult to their memory. The difference between the excitements of those days and our own, which the gentleman in kindness to the latter has overlooked, is simply this: the men of that day went for the right, as secured by the laws. They were the people rising to sustain the laws and constitution of the province. The rioters of our day go for their own wills, right or wrong. Sir, when I heard the gentleman lay down principles which place the murderers of Alton side by side with Otis and Hancock, with Quincy and Adams, I thought those pictured lips [pointing to the portraits in the hall] would have broken into voice to rebuke the recreant American —the slanderer of the dead. [Great applause and counter applause.] The gentleman said that he should sink into insignificance if he dared to gainsay the principles of these resolutions. Sir, for the sentiments he has uttered, on soil consecrated by the prayers of Puritans and the blood of patriots, the earth should have yawned and swallowed him up.

[Applause and hisses, with cries of "Take that back." The uproar became so great that for a long time no one could be heard. At length G. Bond, Esq., and Hon. W. Sturgis came to Mr. Phillips's side at the front of the platform. They were met with cries of "Phillips or nobody," "Make him take back 'recreant,'" "He sha'n't go on till he takes it back." When it was understood they meant to sustain, not to interrupt, Mr. Phillips, Mr. Sturgis was listened to, and said: "I did not come here to take any part in this discussion, nor do I intend to; but I do entreat you, fellow-citizens, by everything you hold sacred,—I conjure you by every association connected with this Hall, consecrated by our fathers to freedom of discussion,—that you listen to every man who addresses you in a decorous manner." Mr. Phillips resumed.]

Fellow-citizens, I cannot take back my words. Surely the Attorney-General, so long and well known here, needs not the aid of your hisses against one so young as I am—my voice never before heard within these walls!

Another ground has been taken to excuse the mob, and throw doubt and discredit on the conduct of Lovejoy and his associates. Allusion has been made to what lawyers understand very well—the "conflict of laws." We are told that nothing but the Mississippi river rolls between St. Louis and Alton; and the conflict of laws somehow or other gives the citizens of the former a right to find fault with the defender of the press for publishing his opinions so near their limits. Will the gentleman

venture that argument before lawyers? How the laws of the two States could be said to come into conflict in such circumstances I question whether any lawyer in this audience can explain or understand. No matter whether the line that divides one sovereign State from another be an imaginary one or ocean-wide, the moment you cross it the State you leave is blotted out of existence, so far as you are concerned. The czar might as well claim to control the deliberations of Faneuil hall, as the laws of Missouri demand reverence or the shadow of obedience from an inhabitant of Illinois.

I must find some fault with the statement which has been made of the events at Alton. It has been asked why Lovejoy and his friends did not appeal to the executive—trust their defense to the police of the city. It has been hinted that, from hasty and ill-judged excitement, the men within the building provoked a quarrel, and that he fell in the course of it, one mob resisting another. Recollect, Sir, that they did act with the approbation and sanction of the mayor. In strict truth, there was no executive to appeal to for protection. The mayor acknowledged that he could not protect them. They asked him if it was lawful for them to defend themselves. He told them it was, and sanctioned their assembling in arms to do so. They were not, then, a mob; they were not merely citizens defending their own property; they were in some sense the *posse comitatus,* adopted for the occasion into the police of the city, acting under the order of a magistrate. It was civil authority resisting lawless violence. Where, then, was the imprudence? Is the doctrine to be sustained here, that it is imprudent for men to aid magistrates in executing the laws?

Men are continually asking each other, Had Lovejoy a right to resist? Sir, I protest against the question, instead of answering it. Lovejoy did not resist, in the sense they mean. He did not throw himself back on the natural right of self-defense. He did not cry anarchy, and let slip the dogs of civil war, careless of the horrors which would follow.

Sir, as I understand this affair, it was not an individual protecting his property; it was not one body of armed men resisting another, and making the streets of a peaceful city run blood with their contentions. It did not bring back the scenes in some old Italian cities, where family met family, and faction met faction, and mutually trampled the laws under foot. No; the men in that house were regularly enrolled, under the sanction of the mayor. There being no militia in Alton,

about seventy men were enrolled with the approbation of the mayor. These relieved each other every other night. About thirty men were in arms on the night of the sixth, when the press was landed. The next evening it was not thought necessary to summon more than half that number; among these was Lovejoy. It was, therefore, you perceive, Sir, the police of the city resisting rioters—civil government breasting itself to the shock of lawless men.

Here is no question about the right of self-defense. It is in fact simply this: Has the civil magistrate a right to put down a riot?

Some persons seem to imagine that anarchy existed at Alton from the commencement of these disputes. Not at all. "No one of us," says an eye-witness and a comrade of Lovejoy, "has taken up arms during these disturbances but at the command of the mayor." Anarchy did not settle down on that devoted city till Lovejoy breathed his last. Till then the law, represented in his person, sustained itself against its foes. When he fell, civil authority was trampled under foot. He had "planted himself on his constitutional rights"—appealed to the laws—claimed the protection of the civil authority—taken refuge under the "broad shield of the Constitution. When through that he was pierced and fell, he fell but one sufferer in a common catastrophe." He took refuge under the banner of liberty—amid its folds; and when he fell, its glorious stars and stripes, the emblem of free institutions, around which cluster so many heart-stirring memories, were blotted out in the martyr's blood.

It has been stated, perhaps inadvertently, that Lovejoy or his comrades fired first. This is denied by those who have the best means of knowing. Guns were first fired by the mob. After being twice fired on, those within the building consulted together and deliberately returned the fire. But suppose they did fire first. They had a right so to do; not only the right which every citizen has to defend himself, but the further right which every civil officer has to resist violence. Even if Lovejoy fired the first gun, it would not lessen his claim to our sympathy, or destroy his title to be considered a martyr in defense of a free press. The question now is, Did he act within the Constitution and the laws? The men who fell in State street on the 5th of March, 1770, did more than Lovejoy is charged with. They were the first assailants. Upon some slight quarrel they pelted the troops with every missile within reach. Did this bate one jot of the eulogy with which Hancock and Warren hallowed their memory, hailing them as the first martyrs in the cause of American liberty?

If, Sir, I had adopted what are called Peace principles, I might lament the circumstances of this case. But all you who believe, as I do, in the right and duty of magistrates to execute the laws, join with me and brand as base hypocrisy the conduct of those who assemble year after year on the Fourth of July, to fight over the battles of the Revolution, and yet "damn with faint praise," or load with obloquy, the memory of this man, who shed his blood in defense of life, liberty, property, and the freedom of the press!

Throughout that terrible night I find nothing to regret but this, that within the limits of our country, civil authority should have been so prostrated as to oblige a citizen to arm in his own defense, and to arm in vain. The gentleman says Lovejoy was presumptuous and imprudent—he "died as the fool dieth." And a reverend clergyman of the city tells us that no citizen has a right to publish opinions disagreeable to the community! If any mob follows such publication, on him rests its guilt! He must wait, forsooth, till the people come up to it and agree with him! This libel on liberty goes on to say that the want of right to speak as we think is an evil inseparable from republican institutions! If this be so, what are they worth? Welcome the despotism of the sultan, where one knows what he may publish and what he may not, rather than the tyranny of this many-headed monster, the mob, where we know not what we may do or say till some fellow-citizen has tried it and paid for the lesson with his life. This clerical absurdity chooses as a check for the abuses of the press, not the law, but the dread of a mob. By so doing, it deprives not only the individual and the minority of their rights, but the majority also, since the expression of their opinion may sometimes provoke disturbance from the minority. A few men may make a mob as well as many. The majority, then, have no right, as Christian men, to utter their sentiments, if by any possibility it may lead to a mob! Shades of Hugh Peters and John Cotton, save us from such pulpits!

Imprudent to defend the liberty of the press! Why? Because the defense was unsuccessful? Does success gild crime into patriotism, and the want of it change heroic self-devotion to imprudence? Was Hampden imprudent when he drew the sword and threw away the scabbard? Yet he, judged by that single hour, was unsuccessful. After a short exile, the race he hated sat again upon the throne.

Imagine yourself present when the first news of Bunker Hill battle reached a New England town. The tale would have run thus: "The

patriots are routed—the red-coats victorious—Warren lies dead upon the field." With what scorn would that Tory have been received, who should have charged Warren with imprudence! who should have said that, bred a physician, he was "out of place" in that battle, and "died as the fool dieth!" [Great applause.] How would the intimation have been received, that Warren and his associates should have waited a better time? But if success be indeed the only criterion of prudence, *Respice finem*—wait till the end.

Presumptuous to assert the freedom of the press on American ground! Is the assertion of such freedom before the age? So much before the age as to leave one no right to make it because it displeases the community? Who invents this libel on his country? It is this very thing which entitles Lovejoy to greater praise. The disputed right which provoked the Revolution—taxation without representation—is far beneath that for which he died. [Here there was a strong and general expression of disapprobation.] One word, gentlemen. As much as thought is better than money, so much is the cause in which Lovejoy died nobler than a mere question of taxes. James Otis thundered in this hall when the king did but touch his pocket. Imagine, if you can, his indignant eloquence, had England offered to put a gag upon his lips. [Great applause.]

The question that stirred the Revolution touched our civil interests. This concerns us not only as citizens, but as immortal beings. Wrapped up in its fate, saved or lost with it, are not only the voice of statesmen, but the instructions of the pulpit, and the progress of our faith.

The clergy "marvelously out of place" where free speech is battled for—liberty of speech on national sins? Does the gentleman remember that freedom to preach was first gained, dragging in its train freedom to print? I thank the clergy here present, as I reverence their predecessors, who did not so far forget their country in their immediate profession as to deem it duty to separate themselves from the struggle of '76—the Mayhews and Coopers, who remembered they were citizens before they were clergymen.

Mr. Chairman, from the bottom of my heart I thank that brave little band at Alton for resisting. We must remember that Lovejoy had fled from city to city—suffered the destruction of three presses patiently. At length he took counsel with friends, men of character, of tried integrity, of wide views, of Christian principle. They thought the crisis had come: it was full time to assert the laws. They saw around

them, not a community like our own, of fixed habits, of character moulded and settled, but one "in the gristle, not yet hardened into the bone of manhood." The people there, children of our older States, seem to have forgotten the blood-tried principles of their fathers the moment they lost sight of our New England hills. Something was to be done to show them the priceless value of the freedom of the press, to bring back and set right their wandering and confused ideas. He and his advisers looked out on a community, staggering like a drunken man, indifferent to their rights and confused in their feelings. Deaf to argument, haply they might be stunned into sobriety. They saw that of which we cannot judge, the necessity of resistance. Insulted law called for it. Public opinion, fast hastening on the downward course, must be arrested.

Does not the event show they judged rightly? Absorbed in a thousand trifles, how has the nation all at once come to a stand? Men begin, as in 1776 and 1640, to discuss principles, to weigh characters, to find out where they are. Haply we may awake before we are borne over the precipice.

I am glad, Sir, to see this crowded house. It is good for us to be here. When liberty is in danger, Faneuil hall has the right, it is her duty, to strike the keynote for these United States. I am glad, for one reason, that remarks such as those to which I have alluded have been uttered here. The passage of these resolutions, in spite of this opposition, led by the Attorney-General of the Commonwealth, will show more clearly, more decisively, the deep indignation with which Boston regards this outrage.

JOHN CALHOUN

TEXAS AND SLAVERY

Mr. Calhoun to Mr. Pakenham

Department of State, Washington, *April 18th*, 1844.

The undersigned, Secretary of State of the United States, has laid before the President the note of the Right Honorable Mr. Pakenham, envoy extraordinary and minister plenipotentiary of Her Britannic

Majesty, addressed to this department on the 26th of February last, together with the accompanying copy of a dispatch of Her Majesty's Principal Secretary of State for Foreign Affairs to Mr. Pakenham. In reply, the undersigned is directed by the President to inform the Right Honorable Mr. Pakenham that, while he regards with pleasure the disavowal of Lord Aberdeen of any intention on the part of Her Majesty's government "to resort to any measures, either openly or secretly, which can tend to disturb the internal tranquility of the slaveholding States, and thereby affect the tranquility of this Union," he at the same time regards with deep concern the avowal, for the first time made to this government, "that Great Britain desires and is constantly exerting herself to procure the general abolition of slavery throughout the world."

So long as Great Britain confined her policy to the abolition of slavery in her own possessions and colonies, no other country had a right to complain. It belonged to her exclusively to determine, according to her own views of policy, whether it should be done or not. But when she goes beyond, and avows it as her settled policy, and the object of her constant exertions, to abolish it throughout the world, she makes it the duty of all other countries, whose safety or prosperity may be endangered by her policy, to adopt such measures as they may deem necessary for their protection.

It is with still deeper concern the President regards the avowal of Lord Aberdeen of the desire of Great Britain to see slavery abolished in Texas, and, as he infers, is endeavoring, through her diplomacy, to accomplish it, by making the abolition of slavery one of the conditions on which Mexico should acknowledge her independence. It has confirmed his previous impressions as to the policy of Great Britain in reference to Texas, and made it his duty to examine with much care and solicitude, what would be its effects on the prosperity and safety of the United States, should she succeed in her endeavors. The investigation has resulted in the settled conviction that it would be difficult for Texas, in her actual condition, to resist what she desires, without supposing the influence and exertions of Great Britain would be extended beyond the limits assigned by Lord Aberdeen; and this, if Texas could not resist the consummation of the object of her desire, would endanger both the safety and prosperity of the Union. Under this conviction, it is felt to be the imperious duty of the Federal government, the common representative and protector of the States of the Union, to adopt, in self-defense, the most effectual measures to defeat it.

This is not the proper occasion to state at large the grounds of this conviction. It is sufficient to say that the consummation of the avowed object of her wishes in reference to Texas would be followed by hostile feelings and relations between that country and the United States, which could not fail to place her under the influence and control of Great Britain. This, from the geographical position of Texas, would expose the weakest and most vulnerable portion of our frontier to inroads, and place in the power of Great Britain the most efficient means of effecting in the neighboring States of this Union what she avows to be her desire to do in all countries where slavery exists. To hazard consequences which would be so dangerous to the prosperity and safety of this Union, without resorting to the most effective measures to prevent them, would be, on the part of the Federal government, an abandonment of the most solemn obligation imposed by the guarantee which the States, in adopting the Constitution, entered into to protect each other against whatever might endanger their safety, whether from without or within. Acting in obedience to this obligation, on which our federal system of government rests, the President directs me to inform you that a treaty has been concluded between the United States and Texas, for the annexation of the latter to the former as a part of its territory, which will be submitted without delay to the Senate, for its approval. This step has been taken as the most effectual, if not the only means of guarding against the threatened danger, and securing their permanent peace and welfare.

It is well known that Texas has long desired to be annexed to this Union; that her people, at the time of the adoption of her Constitution, expressed by an almost unanimous vote her desire to that effect: and that she has never ceased to desire it, as the most certain means of promoting her safety and prosperity. The United States have heretofore declined to meet her wishes; but the time has now arrived when they can no longer refuse, consistently with their own security and peace, and the sacred obligation imposed by their constitutional compact for mutual defense and protection. Nor are they any way responsible for the circumstances which have imposed this obligation on them. They had no agency in bringing about the state of things which has terminated in the separation of Texas from Mexico. It was the Spanish government and Mexico herself which invited and offered high inducements to our citizens to colonize Texas. This, from the diversity of character, habits, religion, and political opinions, necessarily led to the separation,

without the interference of the United States in any manner whatever. It is true the United States, at an early period, recognized the independence of Texas; but in doing so it is well known they but acted in conformity with an established principle to recognize the government *de facto*. They had previously acted on the same principle in reference to Mexico herself, and the other governments which have arisen on the former dominions of Spain on this continent.

They are equally without responsibility for that state of things, already adverted to as the immediate cause of imposing on them, in self-defense, the obligation of adopting the measure they have. They remained passive so long as the policy on the part of Great Britain, which has led to its adoption, had no immediate bearing on their peace and safety. While they conceded to Great Britain the right of adopting whatever policy she might deem best, in reference to the African race, within her own possessions, they on their part claim the same right for themselves. The policy she has adopted in reference to the portion of that race in her dominions may be humane and wise; but it does not follow, if it prove so with her, that it would be so in reference to the United States, and other countries, whose situation differs from hers. But, whether it would be or not, it belongs to each to judge and determine for itself. With us it is a question to be decided, not by the Federal government, but by each member of this Union for itself, according to its own views of its domestic policy, and without any right on the part of the Federal government to interfere in any manner whatever. Its rights and duties are limited to protecting, under the guarantees of the Constitution, each member of this Union, in whatever policy it may adopt in reference to the portion within its respective limits. A large number of the States has decided that it is neither wise nor humane to change the relation which has existed, from their first settlement, between the two races; while others, where the African is less numerous, have adopted the opposite policy.

It belongs not to the government to question whether the former have decided wisely or not; and if it did, the undersigned would not regard this as the proper occasion to discuss the subject. He does not, however, deem it irrelevant to state that, if the experience of more than half a century is to decide, it would be neither humane nor wise in them to change their policy. The census and other authentic documents show that, in all instances in which the States have changed the former relation between the two races, the condition of the African, instead of

being improved, has become worse. They have been invariably sunk into vice and pauperism, accompanied by the bodily and mental inflictions incident thereto—deafness, blindness, insanity, and idiocy—to a degree without example; while in all other States which have retained the ancient relation between them, they have improved greatly in every respect—in number, comfort, intelligence, and morals—as the following facts, taken from such sources, will serve to illustrate:

The number of deaf and dumb, blind, idiots, and insane, of the negroes in the States that have changed the ancient relation between the races, is one out of every ninety-six; while in the States adhering to it, it is one out of every six hundred and seventy-two—that is, seven to one in favor of the latter, as compared with the former.

The number of whites, deaf and dumb, blind, idiots, and insane, in the States that have changed the relation, is one in every five hundred and sixty-one; being nearly six to one against the free blacks in the same States.

The number of negroes who are deaf and dumb, blind, idiots, and insane, paupers, and in prison in the States that have changed, is one out of every six; and in the States that have not, one out of every one hundred and fifty-four, or twenty-two to one against the former, as compared with the latter.

Taking the two extremes of North and South—in the State of Maine, the number of negroes returned as deaf and dumb, blind, insane, and idiots, by the census of 1840, is one out of every twelve; and in Florida, by the same returns, is one out of every eleven hundred and five; or ninety-two to one in favor of the slaves of Florida, as compared with the free blacks of Maine.

In addition, it deserves to be remarked that, in Massachusetts, where the change in the ancient relation of the two races was first made (now more than sixty years since), where the greatest zeal has been exhibited in their behalf, and where their number is comparatively few (but little more than 8,000 in a population of upwards of 730,000), the condition of the African is amongst the most wretched. By the latest authentic accounts, there was one out of every twenty-one of the black population in jails or houses of correction; and one out of every thirteen was either deaf and dumb, blind, idiot, insane, or in prison. On the other hand, the census and other authentic sources of information establish the fact that the condition of the African race throughout all the States, where the ancient relation between the two has been retained,

enjoys a degree of health and comfort which may well compare with that of the laboring population of any country in Christendom; and it may be added that, in no other condition, or in any other age or country, has the negro race ever attained so high an elevation in morals, intelligence, or civilization.

If such be the wretched condition of the race in their changed relation, where their number is comparatively few, and where so much interest is manifested for their improvement, what would it be in those States where the two races are nearly equal in numbers, and where, in consequence, would necessarily spring up mutual fear, jealousy, and hatred between them? It may, in truth, be assumed as a maxim, that two races differing so greatly and in so many respects, cannot possibly exist together in the same country, where their numbers are nearly equal, without the one being subjected to the other. Experience has proved that the existing relation, in which the one is subjected to the other, in the slaveholding States, is consistent with the peace and safety of both, with great improvement to the inferior; while the same experience proves that the relation which it is the desire and object of Great Britain to substitute in its stead in this and all other countries, under the plausible name of the abolition of slavery, would (if it did not destroy the inferior by conflicts, to which it would lead) reduce it to the extremes of vice and wretchedness. In this view of the subject it may be asserted that, what is called slavery, is in reality a political institution, essential to the peace, safety, and propserity of those States of the Union in which it exists. Without, then, controverting the wisdom and humanity of the policy of Great Britain, so far as her own possessions are concerned, it may be safely affirmed, without reference to the means by which it would be affected, that, could she succeed in accomplishing, in the United States, what she avows to be her desire and the object of her constant exertions to effect throughout the world, so far from being wise or humane, she would involve in the greatest calamity the whole country, and especially the race which it is the avowed object of her exertions to benefit.

The undersigned avails himself of this occasion to renew to the Right Honorable Mr. Pakenham the assurance of his distinguished consideration.

J. C. Calhoun.

HENRY CLAY

THE COMPROMISE OF 1850

Resolutions Introduced in the Senate of the United States, by Mr. Clay, January 29, 1850

PREAMBLE.—It being desirable for the peace, concord, and harmony of the Union of these States, to settle and adjust amicably all questions of controversy between them arising out of the institution of Slavery, upon a fair equality and just basis, therefore—

1st. *Resolved,* That California, with suitable boundaries, ought, upon her application, to be admitted as one of the States of this Union, without the imposition by Congress of any restriction to the exclusion or introduction of slavery within those boundaries.

2d. *Resolved,* That as slavery does not exist by law, and is not likely to be introduced into any of the territory acquired by the United States from the Republic of Mexico, it is inexpedient for Congress to provide, by law, either for its introduction into, or its exclusion from, any part of the said territory; and that appropriate territorial Governments ought to be established by Congress, in all of the said territory not assigned as the boundaries of the proposed State of California, without the addition of any restriction or condition on the subject of slavery.

3d. *Resolved,* That the western boundary of the State of Texas ought to be fixed on the Rio del Norte, commencing one marine league from its mouth, and running up that river to the southern line of New Mexico, thence with that line eastwardly, and continuing in the same direction, to the line as established between the United States and Spain, excluding any portion of New Mexico, whether lying on the east or west of that river.

4th. *Resolved,* That it be proposed to the State of Texas that the United States will provide for the payment of all that portion of all the legitimate and bona fide public debts of that State, contracted prior to its annexation to the United States, and for which the duties on for-

eign imports were pledged by the said State to its creditors, not exceeding the sum of —— dollars, in consideration of the duties, as pledged, having been no longer applicable to that object after the said annexation, but having thenceforward become payable to the United States, and upon the condition also that the said State shall, by some solemn and authentic act of her Legislature, or of a convention, relinquish to the United States any claim which it has to any part of New Mexico.

5th. *Resolved,* That it is inexpedient to abolish slavery in the District of Columbia, while that institution continues to exist in the State of Maryland, without the consent of that State, without the consent of the people of the District, and without just compensation to the owners of slaves within the District.

6th. *Resolved,* That it is expedient to prohibit within the District the trade in slaves brought into it from States or places beyond the limits of the District, either to be sold therein, as merchandise, or to be transported to other markets without the District of Columbia.

7th. *Resolved,* That more effectual provision ought to be made by law according to the requirements of the Constitution, for the restitution and delivery of persons bound to service or labor, in any State, who may escape into any other State or Territory of this Union.

8th. *Resolved,* That Congress has no power to prohibit or obstruct the trade in slaves between the slaveholding States, and that the admission or exclusion of slaves brought from one into another of them depends exclusively upon their own particular law.

Speech of Mr. Clay on the Foregoing Resolutions

Delivered February 5th and 6th, 1850

Mr. President, never on any former occasion have I risen under feelings of such painful solicitude. I have seen many periods of great anxiety, of peril, and of danger in this country, and I have never before risen to address any assemblage so oppressed, so appalled, and so anxious; and sir, I hope it will not be out of place to do here, what again and again I have done in my private chamber, to implore of Him who holds the destinies of nations and individuals in His hands, to bestow upon our country His blessing, to calm the violence and rage of party, to still passion, to allow reason once more to resume its empire. And may I not ask of Him too, sir, to bestow on his humble servant, now before him, the blessing of his smies, and of strength

and ability to perform the work which now lies before him? Sir, I have said that I have seen other anxious periods in the history of our country, and if I were to venture, Mr. President, to trace to their original source the cause of all our present dangers, difficulties, and distraction, I should ascribe it to the violence and intemperance of party spirit. To party spirit! Sir, in the progress of this session we have had the testimony of two senators here, who, however they may differ on other matters, concur in the existence of that cause in originating the unhappy differences which prevail throughout the country, on the subject of the institution of slavery.

Parties, in their endeavors to obtain, the one ascendency over the other, catch at every passing or floating plank in order to add strength and power to each. We have been told by the two senators to whom I have referred that each of the parties at the North, in its turn, has moved and endeavored to obtain the assistance of a small party called Abolitionists, in order that the scale in its favor might preponderate against that of its adversary. And all around us, every where, we see too many evidences of the existence of the spirit and intemperance of party. I might go to other legislative bodies than that which is assembled in Congress, and I might draw from them illustrations of the melancholy truth upon which I am dwelling, but I need not pass out of this Capitol itself. I say it, sir, with all deference and respect to that other portion of Congress assembled in the other wing of this Capitol; but what have we seen there? During this very session one whole week has been exhausted—I think about a week—in the vain endeavor to elect a doorkeeper of the House.

And, Mr. President, what was the question in this struggle to elect a doorkeeper? It was not as to the man or the qualities of the man, or who is best adapted to the situation. It was whether the doorkeeper entertained opinions upon certain national measures coincident with this or that side of the House. That was the sole question which prevented the election of a doorkeeper for about the period of a week. Sir, I make no reproaches—none, to either portion of that House: I state the fact; and I state the fact to draw from it the conclusion and to express the hope that there will be an endeavor to check this violence of party.

Sir, what vicissitudes do we not pass through in this short mortal career of ours? Eight years, or nearly eight years ago, I took my leave finally, and, as I supposed, forever, from this body. At that

time I did not conceive of the possibility of ever again returning to it. And if my private wishes and particular inclinations, and the desire during the short remnant of my days to remain in repose and quiet, could have prevailed, you would never have seen me occupying the seat which I now occupy upon this floor. The Legislature of the State to which I belong, unsolicited by me, chose to designate me for this station, and I have come here, sir, in obedience to a sense of stern duty, with no personal objects, no private views, now or hereafter, to gratify. I know, sir, the jealousies, the fears, the apprehensions which are engendered by the existence of that party spirit to which I have referred; but if there be in my hearing now, in or out of this Capitol, any one who hopes, in his race for honors and elevation, for higher honors and higher elevation than that which he now occupies, I beg him to believe that I, at least, will never jostle him in the pursuit of those honors or that elevation. I beg him to be perfectly persuaded that, if my wishes prevail, my name shall never be used in competition with his. I beg to assure him that when my service is terminated in this body, my mission, so far as respects the public affairs of this world and upon this earth, is closed, and closed, if my wishes prevail, forever.

But, sir, it is impossible for us to be blind to the facts which are daily transpiring before us. It is impossible for us not to perceive that party spirit and future elevation mix more or less in all our affairs, in all our deliberations. At a moment when the White House itself is in danger of conflagration, instead of all hands uniting to extinguish the flames, we are contending about who shall be its next occupant. When a dreadful *crevasse* has occurred, which threatens inundation and destruction to all around it, we are contending and disputing about the profits of an estate which is threatened with total submersion.

Mr. President, it is passion, passion—party, party, and intemperance—that is all I dread in the adjustment of the great questions which unhappily at this time divide our distracted country. Sir, at this moment we have in the legislative bodies of this Capitol and in the States, twenty old furnaces in full blast, emitting heat, and passion, and intemperance, and diffusing them throughout the whole extent of this broad land. Two months ago all was calm in comparison to the present moment. All now is uproar, confusion, and menace to the existence of the Union, and to the happiness and safety of this people. Sir, I implore senators, I entreat them, by all that they expect hereafter, and by all that is dear to them here below, to repress the ardor

of these passions, to look to their country, to its interests, to listen to the voice of reason—not as it shall be attempted to be uttered by me, for I am not so presumptuous as to indulge the hope that any thing I may say will avert the effects which I have described, but to listen to their own reason, their own judgment, their own good sense, in determining upon what is best to be done for our country in the actual posture in which we find her. Sir, to this great object have my efforts been directed during the whole session.

I have cut myself off from all the usual enjoyments of social life, I have confined myself almost entirely, with very few exceptions, to my own chamber, and from the beginning of the session to the present time my thoughts have been anxiously directed to the object of finding some plan, of proposing some mode of accommodation, which would once more restore the blessings of concord, harmony and peace to this great country. I am not vain enough to suppose that I have been successful in the accomplishment of this object, but I have presented a scheme, and allow me to say to honorable senators that, if they find in that plan any thing that is defective, if they find in it any thing that is worthy of acceptance, but is susceptible of improvement by amendment, it seems to me that the true and patriotic course is not to denounce it, but to improve it—not to reject without examination any project of accommodation having for its object the restoration of harmony in this country, but to look at it to see if it be susceptible of elaboration or improvement, so as to accomplish the object which I indulge the hope is common to all and every one of us, to restore peace and quiet, and harmony and happiness to this country.

Sir, when I came to consider this subject, there were two or three general purposes which it seemed to me to be most desirable, if possible, to accomplish. The one was, to settle all the controverted questions arising out of the subject of slavery. It seemed to me to be doing very little, if we settled one question and left other distracting questions unadjusted, it seemed to me to be doing but little, if we stopped one leak only in the ship of State, and left other leaks capable of producing danger, if not destruction, to the vessel. I therefore turned my attention to every subject connected with the institution of slavery, and out of which controverted questions had sprung, to see if it were possible or practicable to accommodate and adjust the whole of them. Another principal object which attracted my attention was, to endeavor to form such a scheme of accommodation that neither of the two classes

of States into which our country is so unhappily divided should make any sacrifice of any great principle. I believe, sir, the series of resolutions which I have had the honor to present to the Senate accomplishes that object.

Sir, another purpose which I had in view was this: I was aware of the difference of opinion prevailing between these two classes of States. I was aware that, while one portion of the Union was pushing matters, as it seemed to me, to the greatest extremity, another portion of the Union was pushing them to an opposite, perhaps not less dangerous extremity. It appeared to me, then, that if any arrangement, any satisfactory adjustment could be made of the controverted questions between the two classes of States, that adjustment, that arrangement, could only be successful and effectual by extracting from both parties some concessions—not of principle, not of principle at all, but of feeling, of opinion, in relation to matters in controversy between them. Sir, I believe the resolutions which I have prepared fulfill that object. I believe, sir, that you will find, upon that careful, rational, and attentive examination of them, which I think they deserve, that neither party in some of them make any concession at all; in others the concessions of forbearance are mutual; and in the third place, in reference to the slaveholding States, there are resolutions making concessions to them by the opposite class of States, without any compensation whatever being tendered by them to the non-slaveholding States. I think every one of these characteristics which I have assigned, and the measures which I proposed, is susceptible of clear and satisfactory demonstration by an attentive perusal and critical examination of the resolutions themselves.

WILLIAM HENRY SEWARD

William Henry Seward was born May 16, 1801, in the town of Florida, Orange Co., New York. In 1820 he was graduated from Union College, and three years later began to practice law at Auburn.

After serving in the State senate, he was thrice nominated for governor by the Whigs, and the last two times elected (1838 and 1840).

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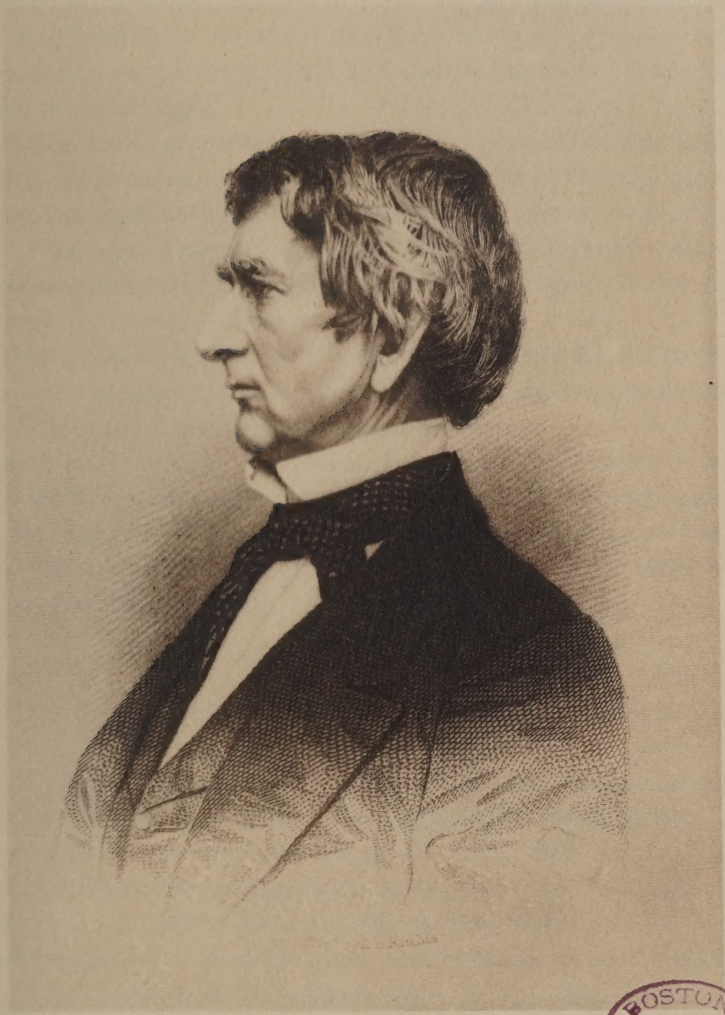

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In 1848, in a speech at Cleveland, he showed the absurdity of the degradation of labor in a republic. This speech sent him to the U. S. Senate the next year. In March, 1849, in a speech on the admission of California, he developed the idea of a law higher than the Constitution, which forbade the introduction of slavery in the territories. This made him the leader of the political anti-slavery elements. It marks a new turn in the struggle.

In 1858 he delivered his "irrepressible conflict" speech, which traced to its logical result the opposition between the systems of free and slave labor. The two systems he showed to be absolutely contradictory, that only one of them could ultimately remain. His words had more influence than Lincoln's of the "house divided against itself," because Seward was more widely known.

In 1860 Seward was the most prominent candidate for the presidency in the Republican party, but the opposition to him wanted a man to defeat Douglas and that man was logically Lincoln.

Seward was Secretary of State in Lincoln's cabinet, and on the night of Lincoln's assassination was himself wounded by a conspirator. Johnson retained him as Secretary of State and Seward supported his reconstruction policy, which cost Seward his popularity with the Republicans. He died Oct. 10, 1872.

THE HIGHER LAW

I shall speak on this as on all subjects, with due respect, but yet frankly and without reservation. The Constitution contains only a compact, which rests for its execution on the states. Not content with this, the slave states induced legislation by Congress; and the Supreme Court of the United States have virtually decided that the whole subject is within the province of Congress, and exclusive of state authority. Nay, they have decided that slaves are to be regarded not merely as persons to be claimed, but as property and chattels, to be seized without any legal authority or claim whatever. The compact is thus subverted by the procurement of the slave states. With what reason, then, can they expect the states *ex gratia* to reassume the obligations from which they caused those states to be discharged? I say, then, to the slave states, you are entitled to no more stringent laws; and that such laws would be useless. The cause of the inefficiency of the pres-

ent statute is not at all the leniency of its provisions. It is a law that deprives the alleged refugee from a legal obligation not assumed by him, but imposed upon him by laws enacted before he was born, of the writ of *habeas corpus,* and of any certain judicial process of examination of the claim set up by his pursuer, and finally degrades him into a chattel which may be seized and carried away peaceably wherever found, even although exercising the rights and responsibilities of a free citizen of the commonwealth in which he resides, and of the United States—a law which denies to the citizen all the safeguards of personal liberty, to render less frequent the escape of the bondman. And since complaints are so freely made against the one side, I shall not hesitate to declare that there have been even greater faults on the other side. Relying on the perversion of the Constitution, which makes slaves mere chattels, the slave states have applied to them the principles of the criminal law, and have held that he who aided the escape of his fellow-man from bondage was guilty of a larceny in stealing him. I speak of what I know. Two instances came within my own knowledge, in which governors of slave states, under the provision of the Constitution relating to fugitives from justice, demanded from the governor of a free state the surrender of persons as thieves whose alleged offences consisted in constructive larceny of the rags that covered the persons of female slaves, whose attempt at escape they had permitted or assisted.

We deem the principle of the law for the recapture of fugitives, as thus expounded, therefore, unjust, unconstitutional, and immoral; and thus, while patriotism withholds its approbation, the consciences of our people condemn it.

You will say that these convictions of ours are disloyal. Grant it for the sake of argument. They are, nevertheless, honest; and the law is to be executed among us, not among you; not by us, but by the federal authority. Has any government ever succeeded in changing the moral convictions of its subjects by force? But these convictions imply no disloyalty. We reverence the Constitution, although we perceive this defect, just as we acknowledge the splendor and the power of the sun, although its surface is tarnished with here and there an opaque spot.

Your constitution and laws convert hospitality to the refugee from the most degrading oppression on earth into a crime, but all mankind except you esteem that hospitality a virtue. The right of extradition of a fugitive from justice is not admitted by the law of nature and of

nations, but rests in voluntary compacts. I know of only two compacts found in diplomatic history that admitted Extradition of Slaves. Here is one of them. It is found in a treaty of peace made between Alexander, Comnenus, and Leontine, Greek Emperors at Constantinople, and Oleg, King of Russia, in the year 902, and is in these words:

"If a Russian slave take flight, or even if he is carried away by any one, under pretence of having been bought, his master shall have the right and power to pursue him, and hunt for and capture him wherever he shall be found; and any person who shall oppose the master in the execution of this right, shall be deemed guilty of violating this treaty, and be punished accordingly."

This was in the year of Grace, 902, in the period called the "Dark Ages," and the contracting powers were despotisms. And here is the other:

"No person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up, on claim of the party to whom such service or labor is due."

This is from the Constitution of the United States in 1787, and the parties were the republican states of this Union. The law of nations disavows such compacts; the law of nature, written on the hearts and consciences of freemen, repudiates them. Armed power could not enforce them, because there is no public conscience to sustain them. I know that there are laws of various sorts which regulate the conduct of men. There are constitutions and statutes, codes mercantile and codes civil; but when we are legislating for states, especially when we are founding states, all these laws must be brought to the standard of the laws of God, and must be tried by that standard, and must stand or fall by it. This principle was happily explained by one of the most distinguished political philosophers of England in these emphatic words:

"There is but one law for all, namely, that law which governs all law; the law of our Creator, the law of humanity, justice, equity, the law of nature and of nations. So far as any laws fortify this primeval law, and give it more precision, more energy, more effect by their declarations, such laws enter into the sanctuary and participate in the sacredness of its character; but the man who quotes as precedents the abuses of tyrants and robbers, pollutes the very fountains of justice, destroys the foundations of all law, and therefore removes the only safeguard against evil men, whether governors or governed; the guard which prevents governors from becoming tyrants, and the governed from becoming rebels."

There was deep philosophy in the confession of an eminent English judge. When he had condemned a young woman to death, under the late sanguinary code of his country, for her first petty theft, she fell down dead at his feet. "I seem to myself," said he, "to have been pronouncing sentence, not against the prisoner, but against the law itself."

To conclude on this point. We are not slaveholders. We cannot, in our judgment, be either true Christian or real freemen, if we impose on another a chain that we defy all human power to fasten on ourselves. You believe and think otherwise, and doubtless with equal sincerity. We judge you not, and He alone who ordained the conscience of man and its laws of action can judge us. Do we, then, in this conflict of opinion, demand of you an unreasonable thing in asking that, since you will have property that can and will exercise human powers to effect its escape, you shall be your own police, and in acting among us as such you shall conform to principles indispensable to the security of admitted rights of freemen? If you will have this law executed, you must alleviate, not increase, its rigors.

Another objection arises out of the principle on which the demand for compromise rests. That principle assumes a classification of the states as northern and southern states, as it is expressed by the honorable senator from South Carolina, [Mr. Calhoun] but into slave states and free states, as more directly expressed by the honorable senator from Georgia, [Mr. Berrien.] The argument is, that the states are severally equal, and that these two classes were equal at the first, and that the Constitution was founded on that equilibrium; that the states being equal, and the classes of the states being equal in rights, they are to be regarded as constituting an association in which each state, and each of these classes of states, respectively, contribute in due proportions; that the new territories are a common acquisition, and the people of these several states and classes of states, have an equal right to participate in them, respectively; that the right of the people of the slave states to emigrate to the territories with their slaves as property is necessary to afford such a participation on their part, inasmuch as the people of the free states emigrate into the same territories with their property. And the argument deduces from this right the principle that, if Congress exclude slavery from any part of this new domain, it would be only just to set off a portion of the domain—some say south of

36° 30′, others south of 34°—which should be regarded at least as free to slavery, and to be organized into slave states.

Argument, ingenious and subtle, declamation earnest and bold, and persuasion gentle and winning as the voice of the turtle dove when it is heard in the land, all alike and all together have failed to convince me of the soundness of this principle of the proposed compromise, or of any one of the propositions on which it is attempted to be established.

How is the original equality of the states proved? It rests on a syllogism of Vattel, as follows: All men are equal by the law of nature and of nations. But states are only lawful aggregrations of individual men, who severally are equal. Therefore, states are equal in natural rights. All this is just and sound. But assuming the same premises, to wit, that all men are equal by the law of nature and of nations, the right of property in slaves falls to the ground; for one who is equal to another cannot be the owner or property of that other. But you answer, that the Constitution recognizes property in slaves. It would be sufficient, then, to reply, that this constitutional recognition must be void, because it is repugnant to the law of nature and of nations. But I deny that the Constitution recognizes property in man. I submit, on the other hand, most respectfully, that the Constitution not merely does not affirm that principle, but, on the contrary, altogether excludes it.

The Constitution does not expressly affirm anything on the subject; all that it contains is two incidental allusions to slaves. These are, first, in the provision establishing a ratio of representation and taxation; and, secondly, in the provision relating to fugitives from labor. In both cases, the Constitution designedly mentions slaves, not as slaves, much less as chattels, but as persons. That this recognition of them as persons was designed is historically known, and I think was never denied. I give only two of the manifold proofs. First, John Jay, in the *Federalist,* says:

"Let the case of the slaves be considered, as it is in truth, a peculiar one. Let the compromising expedient of the Constitution be mutually adopted which regards them as inhabitants, but as debased below the equal level of free inhabitants, which regards the slave as divested of two-fifths of the man."

Yes, sir, of two-fifths, but of only two-fifths; leaving still three-fifths; leaving the slave still an inhabitant, a person, a living, breathing, moving, reasoning, immortal man.

The other proof is from the debates in the convention. It is brief, and I think instructive:

"August 28, 1787.

"Mr. Butler and Mr. Pinckney moved to require fugitive slaves and servants to be delivered up like convicts.

"Mr. Wilson. This would oblige the executive of the state to do it at public expense.

"Mr. Sherman saw no more propriety in the public seizing and surrendering a slave or servant than a horse.

"Mr. Butler withdrew his proposition, in order that some particular provision might be made, apart from this article."

August 29, 1787.

"Mr Butler moved to insert after article 15: 'If any person bound to service or labor in any of the United States shall escape into another state, he or she shall not be discharged from such service or labor in consequence of any regulation subsisting in the state to which they escape, but shall be delivered up to the person justly claiming their service or labor.'"

"After the engrossment, September 15, page 550, article 4, section 2, the third paragraph, the term 'legally' was struck out, and the words 'under the laws thereof' inserted after the word 'state,' in compliance with the wishes of some who thought the term 'legal' equivocal, and favoring the idea that slavery was legal in a moral view."—*Madison Debates, pp.* 487, 492.

I deem it established, then, that the Constitution does not recognize property in man, but leaves that question, as between the states, to the law of nature and of nations. That law, as expounded by Vattel, is founded on the reason of things. When God had created the earth, with its wonderful adaptations, He gave dominion over it to man, absolute human dominion. The title of that dominion, thus bestowed, would have been incomplete, if the lord of all terrestrial things could himself have been the property of his fellow-man.

The right to have a slave implies the right in some one to make the slave; that right must be equal and mutual, and this would resolve society into a state of perpetual war. But if we grant the original equality of the states, and grant also the constitutional recognition of slaves as property, still the argument we are considering fails. Because the states are not parties to the Constitution as states; it is the Constitution of the people of the United States.

But even if the states continue under the Constitution as states, they nevertheless surrendered their equality as states, and submitted themselves to the sway of the numerical majority, with qualifications or checks; first, of the representation of three-fifths of slaves in the ratio of representation and taxation; and, secondly, of the equal representation of states in the Senate.

The proposition of an established classification of states as slave states and free states, as insisted on by some, and into northern and

southern, as maintained by others, seems to me purely imaginary, and of course the supposed equilibrium of those classes a mere conceit. This must be so, because, when the Constitution was adopted, twelve of the thirteen states were slave states, and so there was no equilibrium. And so as to the classification of states as northern states and southern states. It is the maintenance of slavery by law in a state, not parallels of latitude, that makes it a southern state; and the absence of this, that makes it a northern state. And so all the states, save one, were southern states, and there was no equilibrium. But the Constitution was made not only for southern and northern states, but for states neither northern nor southern, namely, the western states, their coming in being foreseen and provided for.

It needs little argument to show that the idea of a joint stock association, or a copartnership, as applicable even by its analogies to the United States, is erroneous, with all the consequences fancifully deduced from it. The United States are a political state, or organized society, whose end is government, for the security, welfare, and happiness of all who live under its protection. The theory I am combating reduces the objects of government to the mere spoils of conquest. Contrary to a theory so debasing, the preamble of the Constitution not only asserts the sovereignty to be, not in the states, but in the people, but also promulgates the objects of the Constitution:

"We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the General Welfare, and secure the blessings of liberty, do ordain and establish this Constitution."

Objects sublime and benevolent! They exclude the very idea of conquests, to be either divided among states or even enjoyed by them, for the purpose of securing, not the blessings of liberty, but the evils of slavery. There is a novelty in the principle of the proposed compromise which condemns it. Simultaneously with the establishment of the Constitution, Virginia ceded to the United States her domain, which then extended to the Mississippi, and was even claimed to extend to the Pacific ocean. Congress accepted it, and unanimously devoted the domain to freedom, in the language from which the ordinance now so severely condemned was borrowed. Five states have already been organized on this domain, from all of which, in pursuance of that ordinance, slavery is excluded. How did it happen that this theory of the equality of states, of the classification of states, of the equilibrium of states, of the title of the states to common enjoyment of the do-

main, or to an equitable and just partition between them, was never promulgated, nor even dreamed of, by the slave states, when they unanimously consented to that ordinance?

There is another aspect of the principle of compromise which deserves consideration. It assumes that slavery, if not the only institution in a slave state, is at least a ruling institution, and that this characteristic is recognized by the Constitution. But slavery is only one of many institutions there. Freedom is equally an institution there. Slavery is only a temporary, accidental, partial, and incongruous one. Freedom, on the contrary, is a perpetual, organic, universal one, in harmony with the Constitution of the United States. The slaveholder himself stands under the protection of the latter, in common with all the free citizens of the state. But it is, moreover, an indispensable institution. You may separate slavery from South Carolina, and the state will still remain; but if you subvert freedom there, the state will cease to exist. But the principle of this compromise gives complete ascendency in the slave states, and in the Constitution of the United States, to the subordinate, accidental and incongruous institution, over its paramount antagonist. To reduce this claim of slavery to an absurdity, it is only necessary to add that there are only two states in which slaves are a majority, and not one in which the slaveholders are not a very disproportionate minority.

But there is yet another aspect in which this principle must be examined. It regards the domain only as a possession to be enjoyed either in common or by partition by the citizens of the old states. It is true, indeed, that the national domain is ours. It is true it was acquired by the valor and with the wealth of the whole nation. But we hold, nevertheless, no arbitrary power over it. We hold no arbitrary authority over anything, whether acquired lawfully or seized by usurpation. The Constitution regulates our stewardship; the Constitution devotes the domain to union, to justice, to defense, to welfare, and to liberty.

But there is a higher law than the Constitution, which regulates our authority over the domain, and devotes it to the same noble purposes. The territory is a part, no inconsiderable part, of the common heritage of mankind, bestowed upon them by the Creator of the universe. We are his stewards, and must so discharge our trust as to secure in the highest attainable degree their happiness. How momentous that trust is, we may learn from the instructions of the founder of modern philosophy:

"No man," says Bacon, "can by care-taking, as the Scripture saith, add a cubit to his stature in this little model of a man's body; but, in the great frame of kingdoms and commonwealths, it is in the power of princes or estates to add amplitude and greatness to their kingdoms. For, by introducing such ordinances, constitutions, and customs, as are wise, they may sow greatness to their posterity and successors. But these things are commonly not observed, but left to take their chance."

This is a state, and we are deliberating for it, just as our fathers deliberated in establishing the institutions we enjoy. Whatever superiority there is in our condition and hopes over those of any other "kingdom" or "estate," is due to the fortunate circumstance that our ancestors did not leave things to "take their chance," but that they "added amplitude and greatness" to our commonwealth "by introducing such ordinances, constitutions, and customs, as were wise." We in our turn have succeeded to the same responsibilities, and we cannot approach the duty before us wisely or justly, except we raise ourselves to the great consideration of how we can most certainly "sow greatness to our posterity and successors."

And now the simple, bold, and even awful question which presents itself to us is this: Shall we, who are founding institutions, social and political, for countless millions; shall we, who know by experience the wise and the just, and are free to choose them, and to reject the erroneous and unjust; shall we establish human bondage, or permit it by our sufferance to be established? Sir, our forefathers would not have hesitated an hour. They found slavery existing here, and they left it only because they could not remove it. There is not only no free state which would now establish it, but there is no slave state, which, if it had had the free alternative as we now have, would have founded slavery. Indeed, our revolutionary predecessors had precisely the same question before them in establishing an organic law under which the states of Ohio, Indiana, Michigan, Illinois, and Wisconsin, have since come into the Union, and they solemnly repudiated and excluded slavery from those states forever. I confess that the most alarming evidence of our degeneracy which has yet been given is found in the fact that we even debate such a question.

STEPHEN A. DOUGLAS

STEPHEN ARNOLD DOUGLAS was born at Brandon, Vermont, April 23, 1813. After being apprenticed to a cabinetmaker, he went to an academy and studied law. In 1833 he moved to Jacksonville, Illinois. The next year he was admitted to the bar and only a year later was elected Attorney-General of the State.

In 1835 he was made a member of the legislature, in 1837 registrar of the land office at Springfield; in 1840 Secretary of State; in 1841 a Judge of the State Supreme Court; in 1843 United States representative; and in 1847 United States Senator. He favored holding all possible of the Oregon territory (1843), the Mexican War, and the compromises of 1850.

In 1854 in formulating a bill for the organization of the new territories of Kansas and Nebraska, he startled the North by bringing in his "squatter sovereignty" idea, that the people of the territories should themselves decide as to whether they should be free or slave. He probably thought to appease the South and at the same time to take the slave question out of national politics, but the act brought on a guerrilla warfare in Kansas and Nebraska, and solidified both sides. It abrogated the Missouri Compromise and took away the limit of 36° 30′ to the extension of slavery. The bill was formally protested against by the "Independent Democrats," Sumner, Chase, etc., and the Republican party was a direct result.

In 1857 the Dred Scott Decision, which we give later, added fresh fuel to the flames by decreeing that a negro could sue for freedom only under the State of his master, and that Congress could not keep slavery out of the territories.

In the great series of debates between Douglas and Lincoln, in 1858, Douglas supported his popular sovereignty idea, and declared himself willing to abide by the decision of the Supreme Court. He was forced, however, to stand by his doctrine that the territories could keep out slavery. This the southern wing of the democracy denied, and the party split on this issue in 1860.

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In 1854 the Kansas-Nebraska Act, as we have seen, added fresh fuel to the flames by declaring that the people could vote for freedom only under the State or Territorial constitutions, and that Congress could not keep slavery out of the territories.

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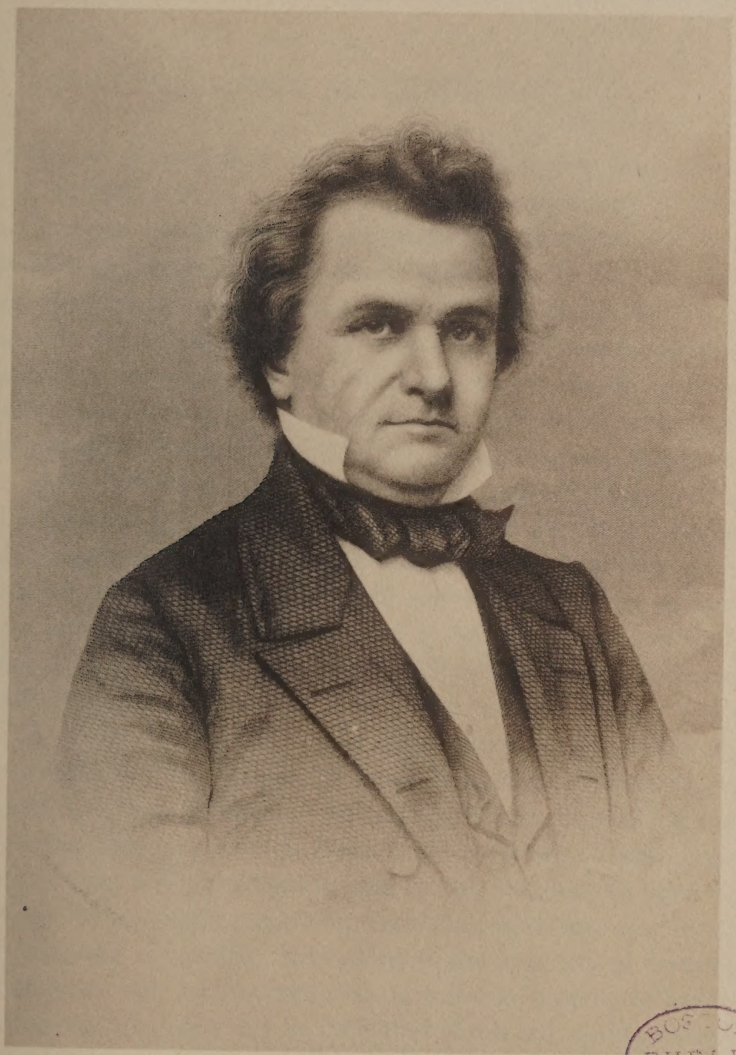

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When secession actually began, Douglas called upon his followers to support the Union and told Lincoln he would put his shoulder to the wheel. He died June 3, 1861.

"SQUATTER SOVEREIGNTY"

I will now proceed to the consideration of the great principle involved in the bill, without omitting, however, to notice some of those extraneous matters which have been brought into this discussion with the view of producing another anti-slavery agitation. We have been told by nearly every Senator who has spoken in opposition to this bill, that at the time of its introduction the people were in a state of profound quiet and repose, that the anti-slavery agitation had entirely ceased, and that the whole country was acquiescing cheerfully and cordially in the compromise measures of 1850 as a final adjustment of this vexed question. Sir, it is truly refreshing to hear Senators, who contested every inch of ground in opposition to those measures, when they were under discussion, who predicted all manner of evils and calamities from their adoption, and who raised the cry of appeal, and even resistance, to their execution, after they had become the laws of the land—I say it is really refreshing to hear these same Senators now bear their united testimony to the wisdom of those measures, and to the patriotic motives which induced us to pass them in defiance of their threats and resistance, and to their beneficial effects in restoring peace, harmony, and fraternity to a distracted country. These are precious confessions from the lips of those who stand pledged never to assent to the propriety of those measures, and to make war upon them so long as they shall remain upon the statute-book. I well understand that these confessions are now made, not with the view of yielding their assent to the propriety of carrying those enactments into faithful execution, but for the purpose of having a pretext for charging upon me, as the author of this bill, the responsibility of an agitation which they are striving to produce. They say that I, and not they, have revived the agitation. What have I done to render me obnoxious to this charge? They say that I wrote and introduced this Nebraska bill. That is true; but I was not a volunteer in the transaction. The Senate, by a unanimous vote, appointed me chairman of the Territorial Committee, and associated five intelligent and patriotic Senators with me, and thus made it our duty to take charge of all Terri-

torial business. In like manner, and with the concurrence of these complaining Senators, the Senate referred to us a distinct proposition to organize this Nebraska Territory, and required us to report specifically upon the question. I repeat, then, we were not volunteers in this business. The duty was imposed upon us by the Senate. We were not unmindful of the delicacy and responsibility of the position. We were aware that, from 1820 to 1850, the abolition doctrine of Congressional interference with slavery in the Territories and new States had so far prevailed as to keep up an incessant slavery agitation in Congress, and throughout the country, whenever any new Territory was to be acquired or organized. We were also aware that, in 1850, the right of the people to decide this question for themselves, subject only to the Constitution, was submitted for the doctrine of Congressional intervention. This first question, therefore, which the committee were called upon to decide, and indeed the only question of any material importance in framing this bill, was this: Shall we adhere to and carry out the principle recognized by the compromise measures of 1850, or shall we go back to the old exploded doctrine of Congressional interference, as established in 1820, in a large portion of the country, and which it was the object of the Wilmot proviso to give a universal application, not only to all the territory which we then possessed, but all which we might hereafter acquire? There are no alternatives. We were compelled to frame the bill upon one or the other of these two principles. The doctrine of 1820 or the doctrine of 1850 must prevail. In the discharge of the duty imposed upon us by the Senate, the committee could not hesitate upon this point, whether we consulted our own individual opinions and principles, or those which were known to be entertained and boldly avowed by a large majority of the Senate. The two great political parties of the country stood solemnly pledged before the world to adhere to the compromise measures of 1850, "in principle and substance." A large majority of the Senate—indeed, every member of the body, I believe, except the two avowed Abolitionists (Mr. Chase and Mr. Sumner)— profess to belong to one or the other of these parties, and hence were supposed to be under a high moral obligation to carry out "the principle and substance" of those measures in all new Territorial organizations. The report of the committee was in accordance with this obligation. I am arraigned, therefore, for having endeavored to represent the opinions and principles of the Senate truly—for having performed my duty in conformity with parliamentary law—for having been faithful to the

trust imposed in me by the Senate. Let the vote this night determine whether I have thus faithfully represented your opinions. When a majority of the Senate shall have passed the bill—when the majority of the States shall have endorsed it through the representatives upon this floor—when a majority of the South and a majority of the North shall have sanctioned it—when a majority of the Whig party and a majority of the Democratic party shall have voted for it—when each of these propositions shall be demonstrated by the vote this night on the final passage of the bill, I shall be willing to submit the question to the country, whether, as the organ of the committee, I performed my duty in the report and bill which have called down upon my head so much denunciation and abuse.

Mr. President, the opponents of this measure have had much to say about the mutations and modifications which this bill has undergone since it was first introduced by myself, and about the alleged departure of the bill, in its present form, from the principle laid down in the original report of the committee as a rule of action in all future Territorial organizations. Fortunately there is no necessity, even if your patience would tolerate such a course of argument at this late hour of the night, for me to examine these speeches in detail, and reply to each charge separately. Each speaker seems to have followed faithfully in the footsteps of his leader in the path marked out by the Abolition confederates in their manifesto, which I took occasion to expose on a former occasion. You have seen them on their winding way, meandering the narrow and crooked path in Indian file, each treading close upon the heels of the other, and neither venturing to take a step to the right or left, or to occupy one inch of ground which did not bear the footprint of the Abolition champion. To answer one, therefore, is to answer the whole. The statement to which they seem to attach the most importance, and which they have repeated oftener, perhaps, than any other, is, that, pending the compromise measures of 1850, no man in or out of Congress ever dreamed of abrogating the Missouri compromise; that from that period down to the present session nobody supposed that its validity had been impaired, or any thing done which rendered it obligatory upon us to make it inoperative hereafter; that at the time of submitting the report and bill to the Senate, on the fourth of January last, neither I nor any member of the committee ever thought of such a thing; and that we could never be brought to the point of abrogating the eighth section of the Missouri act until after the Senator from Kentucky introduced his amendment to my bill.

Mr. President, before I proceed to expose the many misrepresentations contained in this complicated charge, I must call the attention of the Senate to the false issue which these gentlemen are endeavoring to impose upon the country, for the purpose of diverting public attention from the real issue contained in the bill. They wish to have the people believe that the abrogation of what they call the Missouri compromise was the main object and aim of the bill, and that the only question involved is, whether the prohibition of slavery north of 36° 30′ shall be repealed or not? That which is a mere incident they choose to consider the principal. They make war on the means by which we propose to accomplish an object, instead of openly resisting the object itself. The principle which we propose to carry into effect by the bill is this: *That Congress shall neither legislate slavery into any Territories or State, nor out of the same; but the people shall be left free to regulate their domestic concerns in their own way, subject only to the Constitution of the United States.*

In order to carry this principle into practical operation, it becomes necessary to remove whatever legal obstacles might be found in the way of its free exercise. It is only for the purpose of carrying out this great fundamental principle of self-government that the bill renders the eighth section of the Missouri act inoperative and void.

Now, let me ask, will these Senators who have arraigned me, or any one of them, have the assurance to rise in his place and declare that this great principle was never thought of or advocated as applicable to Territorial bills, in 1850; that from that session until the present nobody ever thought of incorporating this principle in all new Territorial organizations; that the Committee on Territories did not recommend it in their report; and that it required the amendment of the Senator from Kentucky to bring us up to that point? Will any one of my accusers dare to make this issue, and let it be tried by the record? I will begin with the compromises of 1850. Any Senator who will take the trouble to examine our journals, will find that on the 25th of March of that year I reported from the Committee on Territories two bills including the following measures; the admission of California, a Territorial government for New Mexico, and the adjustment of the Texas boundary. These bills proposed to leave the people of Utah and New Mexico free to decide the slavery question for themselves, in the precise language of the Nebraska bill now under discussion. A few weeks afterward the committee of thirteen took those two bills and put a wafer between

them, and reported them back to the Senate as one bill, with some slight amendments. One of these amendments was, that the Territorial Legislatures should not legislate upon the subject of African slavery. I objected to that provision upon the ground that it subverted the great principle of self-government upon which the bill had been originally framed by the Territorial Committee. On the first trial, the Senate refused to strike it out, but subsequently did so, after full debate, in order to establish that principle as the rule of action in Territorial organizations. * * * But my accusers attempt to raise up a false issue, and thereby divert public attention from the real one, by the cry that the Missouri compromise is to be repealed or violated by the passage of this bill. Well, if the eighth section of the Missouri act, which attempted to fix the destinies of future generations in those Territories for all time to come, in utter disregard of the rights and wishes of the people when they should be received into the Union as States, be inconsistent with the great principles of self-government and the Constitution of the United States, it ought to be abrogated. The legislation of 1850 abrogated the Missouri compromise, so far as the country embraced within the limits of Utah and New Mexico was covered by the slavery restriction. It is true, that those acts did not in terms and by name repeal the act of 1820, as originally adopted, or as extended by the resolutions annexing Texas in 1845, any more than the report of the Committee on Territories proposed to repeal the same acts this session. But the acts of 1850 did authorize the people of those Territories to exercise "all rightful powers of legislation consistent with the Constitution," not excepting the question of slavery; and did provide that, when those Territories should be admitted into the Union, they should be received with or without slavery as the people thereof might determine at the date of their admission. These provisions were in direct conflict with a clause in the former enactment, declaring that slavery should be forever prohibited in any portion of said Territories, and hence rendered such clause inoperative and void to the extent of such conflict. This was an inevitable consequence resulting from the provisions in those acts, which gave the people the right to decide the slavery question for themselves, in conformity with the Constitution. It was not necessary to go farther and declare that certain previous enactments, which were incompatible with the exercise of the powers conferred in the bills, are hereby repealed. The very act of granting those powers and rights has the legal effect of removing all obstructions to the exercise of them by the people,

as prescribed in those Territorial bills. Following that example, the Committee on Territories did not consider it necessary to declare the eighth section of the Missouri act repealed. We were content to organize Nebraska in the precise language of the Utah and New Mexican bills. Our object was to leave the people entirely free to form and regulate their domestic institutions and internal concerns in their own way, under the Constitution; and we deemed it wise to accomplish that object in the exact terms in which the same thing had been done in Utah and New Mexico by the acts of 1850. This was the principle upon which the committee voted; and our bill was supposed, and is now believed, to have been in accordance with it. When doubts were raised whether the bill did fully carry out the principle laid down in the report, amendments were made from time to time, in order to avoid all misconstruction, and make the true intent of the act more explicit. The last of these amendments was adopted yesterday, on the motion of the distinguished Senator from North Carolina (Mr. Badger), in regard to the revival of any laws or regulations which may have existed prior to 1820. That amendment was not intended to change the legal effect of the bill. Its object was to repel the slander which had been propagated by the enemies of the measure in the North—that the Southern supporters of the bill desired to legislate slavery into these Territories. The South denies the right of Congress either to legislate slavery into any Territory or State, or out of any Territory or State. Non-intervention by Congress with slavery in the States or Territories is the doctrine of the bill, and all the amendments which have been agreed to have been made with the view of removing all doubt and cavil as to the true meaning and object of the measure.

The Declaration of Independence had its origin in the violation of that great fundamental principle which secured to the colonies the right to regulate their own domestic affairs in their own way; and the Revolution resulted in the triumph of that principle, and the recognition of the right asserted by it. Abolitionism proposes to destroy the right and extinguish the principle for which our forefathers waged a seven years' bloody war, and upon which our whole system of free government is founded. They not only deny the application of this principle to the Territories, but insist upon fastening the prohibition upon all the States to be formed out of those Territories. Therefore, the doctrine of the Abolitionists—the doctrine of the opponents of the Nebraska and Kan-

sas bill, and the advocates of the Missouri restriction—demands Congressional interference with slavery not only in the Territories, but in all the new States to be formed therefrom. It is the same doctrine, when applied to the Territories and new States of this Union, which the British Government attempted to enforce by the sword upon the American colonies. It is this fundamental principle of self-government which constitutes the distinguishing feature of the Nebraska bill. The opponents of the principle are consistent in opposing the bill. I do not blame them for their opposition. I only ask them to meet the issue fairly and openly, by acknowledging that they are opposed to the principle which it is the object of the bill to carry into operation. It seems that there is no power on earth, no intellectual power, no mechanical power, that can bring them to a fair discussion of the true issue. If they hope to delude the people and escape detection for any considerable length of time under the catch-words "Missouri compromise" and "faith of compacts," they will find that the people of this country have more penetration and intelligence than they have given them credit for.

Mr. President, there is an important fact connected with this slavery regulation, which should never be lost sight of. It has always arisen from one and the same cause. Whenever that cause has been removed, the agitation has ceased; and whenever the cause has been renewed, the agitation has sprung into existence. That cause is, and ever has been, the attempt on the part of Congress to interfere with the question of slavery in the Territories and new States formed therefrom. Is it not wise then to confine our action within the sphere of our legitimate duties, and leave this vexed question to take care of itself in each State and Territory, according to the wishes of the people thereof, in conformity to the forms, and in subjection to the provisions, of the Constitution?

The opponents of the bill tell us that agitation is no part of their policy; that their great desire is peace and harmony; and they complain bitterly that I should have disturbed the repose of the country by the introduction of this measure! Let me ask these professed friends of peace, and avowed enemies of agitation, how the issue could have been avoided? They tell me that I should have let the question alone; that is, that I should have left Nebraska unorganized, the people unprotected, and the Indian barrier in existence, until the swelling tide of emigration should burst through, and accomplish by violence what it is the part of wisdom and statesman-

ship to direct and regulate by law. How long could you have postponed action with safety? How long could you maintain that Indian barrier, and restrain the onward march of civilization, Christianity, and free government by a barbarian wall? Do you suppose that you could keep that vast country a howling wilderness in all time to come, roamed over by hostile savages, cutting off all safe communication between our Atlantic and Pacific possessions? I tell you that the time for action has come, and cannot be postponed. It is a case in which the "let-alone" policy would precipitate a crisis which must inevitably result in violence, anarchy, and strife.

You cannot fix bounds to the onward march of this great and growing country. You cannot fetter the limbs of the young giant. He will burst all your chains. He will expand, and grow, and increase, and extend civilization, Christianity, and liberal principles. Then, sir, if you cannot check the growth of the country in that direction, is it not the part of wisdom to look the danger in the face, and provide for an event which you cannot avoid? I tell you, sir, you must provide for lines of continuous settlement from the Mississippi valley to the Pacific ocean. And in making this provision, you must decide upon what principles the Territories shall be organized; in other words, whether the people shall be allowed to regulate their domestic institutions in their own way, according to the provisions of this bill, or whether the opposite doctrine of Congressional interference is to prevail. Postpone it, if you will; but whenever you do act, this question must be met and decided.

The Missouri compromise was interference; the compromise of 1850 was non-interference, leaving the people to exercise their rights under the Constitution. The Committee on Territories were compelled to act on this subject. I, as their chairman, was bound to meet the question. I chose to take the responsibility regardless of consequences personal to myself. I should have done the same thing last year, if there had been time; but we know, considering the late period at which the bill then reached us from the House, that there was not sufficient time to consider the question fully, and to prepare a report upon the subject. I was, therefore, persuaded by my friends to allow the bill to be reported to the Senate, in order that such action might be taken as should be deemed wise and proper. The bill was never taken up for action—the last night of the session having been exhausted in debate on a motion to take up the bill. This session, the measure was introduced by my friend from Iowa (Mr. Dodge), and referred to the Territorial Committee

during the first week of the session. We had abundance of time to consider the subject; it is a matter of pressing necessity, and there was no excuse for not meeing it directly and fairly. We were compelled to take our position upon the doctrine either of intervention or non-intervention. We chose the latter for two reasons: first, because we believed that the principle was right; and, second, because it was the principle adopted in 1850, to which the two great political parties of the country were solemnly pledged.

There is another reason why I desire to see this principle recognized as a rule of action in all time to come. It will have the effect to destroy all sectional parties and sectional agitations. If, in the language of the report of the committee, you withdraw the slavery question from the halls of Congress and the political arena, and commit it to the arbitrament of those who are immediately interested in and alone responsible for its consequences, there is nothing left out of which sectional parties can be organized. It never was done, and never can be done on the bank, tariff, distribution, or any party issue which has existed, or may exist, after this slavery question is withdrawn from politics. On every other political question these have always supporters and opponents in every portion of the Union—in each State, county, village, and neighborhood—residing together in harmony and good fellowship, and combating each other's opinions and correcting each other's errors in a spirit of kindness and friendship. These differences of opinion between neighbors and friends, and the discussions that grow out of them, and the sympathy which each feels with the advocates of his own opinions in every portion of this widespread Republic, add an overwhelming and irresistible moral weight to the strength of the Confederacy. Affection for the Union can never be alienated or diminished by any other party issues than those which are joined upon sectional or geographical lines. When the people of the North shall all be rallied under one banner, and the whole South marshalled under another banner, and each section excited to frenzy and madness by hostility to the institutions of the other, then the patriot may well tremble for the perpetuity of the Union. Withdraw the slavery question from the political arena, and remove it to the States and Territories, each to decide for itself, such a catastrophe can never happen. Then you will never be able to tell, by any Senator's vote for or against any measure, from what State or section of the Union he comes.

Why, then, can we not withdraw this vexed question from politics?

Why can we not adopt the principle of this bill as a rule of action in all new Territorial organizations? Why can we not deprive these agitators of their vocation and render it impossible for Senators to come here upon bargains on the slavery question? I believe that the peace, the harmony, and perpetuity of the Union require us to go back to the doctrines of the Revolution, to the principles of the Constitution, to the principles of the Compromise of 1850, and leave the people, under the Constitution, to do as they may see proper in respect to their own internal affairs.

Mr. President, I have not brought this question forward as a Northern man or as a Southern man. I am unwilling to recognize such divisions and distinctions. I have brought it forward as an American Senator, representing a State which is true to this principle, and which has approved of my action in respect to the Nebraska bill. I have brought it forward not as an act of justice to the South more than to the North. I have presented it especially as an act of justice to the people of those Territories and of the States to be formed therefrom, now and in all time to come. I have nothing to say about Northern rights or Southern rights. I know of no such divisions or distinctions under the Constitution. The bill does equal and exact justice to the whole Union, and every part of it; it violates the right of no State or Territory; but places each on a perfect equality, and leaves the people thereof to the free enjoyment of all their rights under the Constitution.

Now, sir, I wish to say to our Southern friends that if they desire to see this great principle carried out, now is their time to rally around it, to cherish it, preserve it, make it the rule of action in all future time. If they fail to do it now, and thereby allow the doctrine of interference to prevail, upon their heads the consequences of that interference must rest. To our Northern friends, on the other hand, I desire to say, that from this day henceforward they must rebuke the slander which has been uttered against the South, that they desire to legislate slavery into the Territories. The South has vindicated her sincerity, her honor, on that point by bringing forward a provision negativing, in express terms, any such effect as a result of this bill. I am rejoiced to know that while the proposition to abrogate the eighth section of the Missouri act comes from a free State, the proposition to negative the conclusion that slavery is thereby introduced, comes from a slave-holding State. Thus, both sides furnish conclusive evidence that they go for the principle, and the principle only, and desire to take no advantage of any possible misconstruction.

Mr. President, I feel that I owe an apology to the Senate for having occupied their attention so long, and a still greater apology for having discussed the question in such an incoherent and desultory manner. But I could not forbear to claim the right of closing this debate. I thought gentlemen would recognize its propriety when they saw the manner in which I was assailed and misrepresented in the course of this discussion, and especially by assaults still more disreputable in some portions of the country. These assaults have had no other effect upon me than to give me courage and energy for a still more resolute discharge of duty. I say frankly that, in my opinion this measure will be as popular at the North as at the South, when its provisions and principles shall have been fully developed, and become well understood. The people at the North are attached to the principles of self-government, and you cannot convince them that that is self-government which deprives a people of the right of legislating for themselves, and compels them to receive laws which are forced upon them by a Legislature in which they are not represented. We are willing to stand upon this great principle of self-government everywhere; and it is to us a proud reflection that, in this whole discussion, no friend of the bill has urged an argument in its favor which could not be used with the same propriety in a free State as in a slave State, and *vice versa.* No enemy of the bill has used an argument which would bear repetition one mile across Mason and Dixon's line. Our opponents have dealt entirely in sectional appeals. The friends of the bill have discussed a great principle of universal application, which can be sustained by the same reasons, and the same arguments, in every time and in every corner of the Union.

CRYSTALLIZATION OF SENTIMENT AGAINST THE EXTENSION OF SLAVERY

As soon as the significance of the Douglas Kansas and Nebraska bill became evident the most prominent anti-slavery democrats in Congress united in the solemn appeal against the bill to the people which is given below. Sumner, Chase, Giddings, and Wade are its best known signers. Seward and Everett led the Whig opposition to the bill. Its passage roused and solidified the anti-slavery sentiment of the North. Thirty members of Congress met and could see little hope in the old parties. A state convention of Whigs and Free Soilers met in Michigan and gave a nucleus and the name to the new Republican party. The idea swept rapidly over the North and within a year the new party elected eleven Senators.

The birth of the Republican party is important because it was the first great party that opposed absolutely the extension of slavery. The Abolitionists had denounced slavery as a sin, but their disunion sentiments had left them in disrepute and they kept out of politics entirely. The Free Soil and Liberty parties, though they presaged a great new party and became a part of it, yet were themselves minor movements.

On the other hand it must be remembered that the Republican party disclaimed against the abolitionists and any interference with slavery in the slave states.

APPEAL OF THE INDEPENDENT DEMOCRATS

Appeal of the Independent Democrats in Congress to the People of the United States.

SHALL SLAVERY BE PERMITTED IN NEBRASKA?

WASHINGTON, January 19, 1854.

FELLOW-CITIZENS: As Senators and Representatives in the Congress of the United States, it is our duty to warn our constituents whenever imminent danger menaces the freedom of our institutions or the permanency of our Union.

Such danger, as we firmly believe, now impends, and we earnestly solicit your prompt attention to it.

At the last session of Congress, a bill for the organization of the Territory of Nebraska passed the House of Representatives with an overwhelming majority. That bill was based on the principle of excluding slavery from the new Territory. It was not taken up for consideration in the Senate, and consequently failed to become a law.

At the present session, a new Nebraska bill has been reported by the Senate Committee on Territories, which, should it unhappily receive the sanction of Congress, will open all the unorganized territory of the Union to the ingress of slavery.

We arraign this bill as a gross violation of a sacred pledge; as a criminal betrayal of precious rights; as a part and parcel of an atrocious plot to exclude from a vast unoccupied region immigrants from the Old World, and free laborers from our own States, and convert it into a dreary region of despotism, inhabited by masters and slaves.

Take your maps, fellow-citizens, we entreat you, and see what country it is which this bill, gratuitously and recklessly, proposes to open to slavery.

From the southwestern corner of Missouri pursue the parallel of 36° 30′ north latitude, westerly across the Arkansas, across the north fork of Canadian to the northeastern angle of Texas; then following the northern boundary of Texas, to the western limit of New Mexico; then proceed along that western line to its northern termination; then again turn westwardly, and follow the northern line of New Mexico to the crest of the Rocky Mountains; then ascend northwardly along the crest of that mountain range to the line which separates the United States from the British possessions in North America, on the 49th parallel of north latitude; then pursue your course eastwardly along that line to the White Earth river, which falls into the Missouri from the north. Descend that river to its confluence with the Missouri; descend the Missouri, along the western border of Minnesota, of Iowa, of Missouri, to the point where it ceases to be a boundary line, and enters the State to which it gives its name; then continue your southward course along the western limit of that State to the point from which you set out. You have now made the circuit of the proposed Territory of Nebraska. You have traversed the vast distance of more than three thousand miles. You have traced the outline of an area of four hundred and

eighty-five thousand square miles; more than twelve times as great as that of Ohio.

This immense region, occupying the very heart of the North American Continent, and larger, by thirty-three thousand square miles, than all the existing free States, excluding California—this immense region, well watered and fertile, through which the middle and northern routes from the Atlantic to the Pacific must pass—this immense region, embracing all the unorganized territory of the nation, except the comparatively insignificant district of Indian territory north of Red river and between Arkansas and Texas, and now far more than thirty years regarded by the common consent of the American people as consecrated to freedom by statute and by compact—this immense region, the bill now before the Senate, without reason and without excuse, but in flagrant disregard of sound policy and sacred faith, purposes to open to slavery.

We beg your attention, fellow-citizens, to a few historical facts.

The original settled policy of the United States, clearly indicated by the Jefferson proviso of 1784, and by the ordinance of 1787, was non-extension of slavery.

In 1803, Louisiana was acquired by purchase from France. At that time there were some twenty-five or thirty thousand slaves in this Territory, most of them within what is now the State of Louisiana; a few only, further north, on the west bank of the Mississippi. Congress, instead of providing for the abolition of slavery in this new Territory, permitted its continuance. In 1812 the State of Louisiana was organized and admitted into the Union with slavery.

In 1818, six years later, the inhabitants of the Territory of Missouri applied to Congress for authority to form a State constitution and for admission into the Union. There were, at that time, in the whole territory acquired from France, outside of the State of Louisiana, not three thousand slaves.

There was no apology in the circumstances of the country for the continuance of slavery. The original national policy was against it, and, not less, the plain language of the treaty under which the Territory had been acquired from France.

It was proposed, therefore, to incorporate in the bill authorizing the formation of a State Government, a provision requiring that the constitution of the new State should contain an article providing for the abolition of existing slavery, and prohibiting the further introduction of slaves.

This provision was vehemently and pertinaciously opposed, but finally prevailed in the House of Representatives by a decided vote. In the Senate it was rejected, and in consequence of the disagreement between the two Houses, the bill was lost.

At the next session of Congress the controversy was renewed with increased violence. It was terminated at length by a compromise. Missouri was allowed to come into the Union with slavery; but a section was inserted in the act authorizing her admission, excluding slavery forever from all the Territory acquired from France, not included in the new State, lying north of 36° 30′.

We quote the prohibitory section:

"SECTION 8. *Be it further enacted,* That in all that territory ceded by France to the United States, under the name of Louisiana, which lies north of 36° and 30′ of north latitude, not included within the limits of the State contemplated by this act, slavery and involuntary servitude, otherwise than as the punishment of crimes, shall be and is hereby forever prohibited."

The question of the constitutionality of this prohibition was submitted by President Monroe to his cabinet. John Quincy Adams was then Secretary of State; John C. Calhoun was Secretary of War; William H. Crawford was Secretary of the Treasury; and William Wirt was Attorney-General. Each of these eminent men, three of them being from slave States, gave a written opinion, affirming its constitutionality, and thereupon the act received the sanction of the President himself, also from a slave State.

Nothing is more certain in history than the fact that Missouri could not have been admitted as a slave State had not certain members from the free States been reconciled to the measure by the incorporation of this prohibition into the act of admission. Nothing is more certain than that this prohibition has been regarded and accepted by the whole country as a solemn compact against the extension of slavery into any part of the Territory acquired from France, lying North of 36° 30′, and not included in the new State of Missouri. The same act—let it be ever remembered—which authorized the formation of a Constitution for the State, without a clause forbidding slavery, consecrated beyond question, and beyond honest recall, the whole remainder of the Territory to freedom and free institutions forever. For more than thirty years—during more than half the period of our National existence under our present Constitution—this compact has been universally regarded and acted

upon as inviolable American law. In conformity with it, Iowa was admitted as a free State and Minnesota has been organized as a free Territory.

It is a strange and ominous fact well calculated to awaken the worst apprehension, and the most fearful forebodings of future calamities, that it is now deliberately purposed to repeal this prohibition, by implication or directly—the latter certainly the manlier way—and thus to subvert this compact, and allow slavery in all the yet unorganized territory.

We cannot, in this address, review the various pretences under which it is attempted to cloak this monstrous wrong; but we must not altogether omit to notice one.

It is said that the Territory of Nebraska sustains the same relations to slavery as did the territory acquired from Mexico prior to 1850, and that the pro-slavery clauses of the bill are necessary to carry into effect the compromises of that year.

No assertion could be more groundless.

Three acquisitions of territory have been made by treaty. The first was from France. Out of this territory have been created the three slave States of Louisiana, Arkansas, and Missouri, and the single free State of Iowa. The controversy which arose in relation to the then unorganized portion of this territory was closed in 1820 by the Missouri act, containing the slavery prohibition as has been already stated. This controversy related only to territory acquired from France. The act by which it was terminated was confined, by its own express terms, to the same territory, and had no relation to any other.

The second acquisition was from Spain. Florida, the territory thus acquired, was yielded to slavery without a struggle, and almost without a murmur.

The third was from Mexico. The controversy which arose from this acquisition is fresh in the remembrance of the American people. Out of it sprung the acts of Congress, commonly known as the compromise measures of 1850, by one of which California was admitted as a free State; while two others, organizing the Territories of New Mexico and Utah, exposed all the residue of the recently acquired territory to the invasion of slavery.

These acts were never supposed to abrogate or touch the existing exclusion of slavery from what is now called Nebraska. They applied to the territory acquired from Mexico, and to that only. They were intended as a settlement of the controversy growing out of that acquisi-

tion, and of that controversy only. They must stand or fall by their own merits.

The statesmen whose powerful support carried the Utah and New Mexico acts, never dreamed that their provisions would ever be applied to Nebraska. Even at the last session of Congress, Mr. Atchison, of Missouri, in a speech in favor of taking up the former Nebraska bill, on the morning of the 4th of March, 1853, said: "It is evident that the Missouri compromise cannot be repealed. So far as that question is concerned, we might as well agree to the admission of this Territory now as next year, or five or ten years hence." These words could not have fallen from this watchful guardian of slavery had he supposed that this Territory was embraced by the pro-slavery provisions of the compromise acts. This pretension had not then been set up. It is a palpable afterthought.

The compromise acts themselves refute this pretension. In the third article of the second section of the joint resolution for annexing Texas to the United States, it is expressly declared that "in such State or States as shall be formed out of said territory north of said Missouri compromise line, slavery or involuntary servitude, except for crime, shall be prohibited;" and in the act for organizing New Mexico and settling the boundary of Texas, a proviso was incorporated, on the motion of Mr. Mason, of Virginia, which distinctly preserves this prohibition, and flouts the barefaced pretension that all the territory of the United States, whether south or north of the Missouri compromise line, is to be open to slavery. It is as follows:

"*Provided,* That nothing herein contained shall be construed to impair or qualify anything contained in the third article of the second section of the joint resolution for annexing Texas to the United States, approved March 1, 1845, either as regards the number of States that may hereafter be formed out of the State of Texas, or otherwise."

Here is proof, beyond controversy, that the principle of the Missouri Act prohibiting slavery north of 36° 30′, far from being abrogated by the compromise acts, is expressly affirmed; and that the proposed repeal of this prohibition instead of being an affirmation of the compromise acts, is a repeal of a very prominent provision of the most important act of the series. It is solemnly declared, in the very compromise acts, "that nothing herein contained shall be construed to impair or qualify" the prohibition of slavery north of 36° 30′; and yet, in the face of this declaration, that sacred prohibition is said to be over-

thrown. Can presumption further go? To all who, in any way, lean upon these compromises, we commend this exposition.

The pretenses, therefore, that the territory, covered by the positive prohibition of 1820, sustains a similar relation to slavery with that acquired from Mexico, covered by no prohibition except that of disputed constitutional or Mexican law, and that the compromises of 1850 require the incorporation of the pro-slavery clauses of the Utah and New Mexico bill in the Nebraska Act, are mere inventions, designed to cover up from public reprehension meditated bad faith. Were he living now, no one would be more forward, more eloquent, or more indignant in his denunciation of that bad faith than Henry Clay, the foremost champion of both compromises.

In 1820 the slave States said to the free States: "Admit Missouri with slavery and refrain from positive exclusion south of 36° 30′ and we will join you in perpetual prohibition north of that line." The free States consented. In 1854 the slave States say to the free States: "Missouri is admitted; no prohibition of slavery south of 36° 30′ has been attempted; we have received the full consideration of our agreement; no more is to be gained by adherenc to it on our part, we therefore propose to cancel the compact." If this be not Punic faith, what is it? Not without the deepest dishonor and crime can the free States acquiesce in this demand.

We confess our total inability properly to delineate the character or describe the consequences of this measure. Language fails to express the sentiments of indignation and abhorrence which it inspires; and no vision less penetrating and comprehensive than that of the All-Seeing, can reach the evil issues.

To some of its more immediate and inevitable consequences, however, we must attempt to direct your attention.

What will be the effect of this measure, should it unhappily become a law, upon the proposed Pacific Railroad? We have already said that two of the principal routes, the central and the northern, traverse this territory. If slavery be allowed there, the settlement and cultivation of the country must be greatly retarded. Inducements to the immigration of free laborers will be almost destroyed. The enhanced cost of construction, and the diminished expectation of profitable returns, will present almost insuperable obstacles to building the road at all; while, even if made, the difficulty and expense of keeping it up, in a country from which the energetic and intelligent masses will be virtually excluded, will greatly impair its usefulness and value.

From the rich lands of this large territory, also, patriotic statesmen have anticipated that a free, industrious, and enlightened population will extract abundant treasures of individual and public wealth. There, it has been expected, freedom-loving emigrants from Europe, and energetic and intelligent laborers from our own land, will find homes of comfort and fields of useful enterprise. If this bill shall become a law, all such expectation will turn to grievous disappointment. The blight of slavery will cover the land. The homestead law, should Congress enact one, will be worthless there. Freemen, unless pressed by a hard and cruel necessity, will not, and should not, work beside slaves. Labor cannot be respected where any class of laborers is held in abject bondage.

We earnestly request the enlightened conductors of newspapers printed in the German and other foreign languages to direct the attention of their readers to this important matter.

It is of immense consequence, also, to scrutinize the geographical character of this project. We beg you, fellow-citizens, to observe that it will sever the East from the West of the United States by a wide slave-holding belt of country, extending from the Gulf of Mexico to British North America. It is a bold scheme against American liberty, worthy of an accomplished architect of ruin. Texas is already slave-holding, and occupies the Gulf region from the Sabine to the Rio Grande, and from the Gulf of Mexico to the Red river. North of the Red river, and extending between Texas and Arkansas, to the parallel of 36° 30′, lies the Indian territory, about equal in extent to the latter State, in which slavery was not prohibited by the act of 1820. From 36° 30′ to the boundary line between our own country and the British possessions, stretching from west to east through more than eleven degrees of longitude, and from south to north through more than twelve degrees of latitude, extends the great territory, the fate of which is now to be determined by the American Congress. Thus you see, fellow-citizens, that the first operation of the proposed permission of slavery in Nebraska will be to stay the progress of the free States westward, and to cut off the free States of the Pacific from the free States of the Atlantic. It is hoped, doubtless, by compelling the whole commerce and the whole travel between the East and West to pass for hundreds of miles through a slave-holding region in the heart of the continent, and by the influence of a Federal Government controlled by the slave power to extinguish freedom and establish slavery in the States and Territories of the Pacific, and thus permanently subjugate the whole country to the yoke

of a slave-holding despotism. Shall a plot against humanity and democracy so monstrous, and so dangerous to the interests of liberty throughout the world, be permitted to succeed?

We appeal to the people. We warn you that the dearest interests of freedom and the Union are in imminent peril. Demagogues may tell you that the Union can be maintained only by submitting to the demands of slavery. We tell you that the safety of the Union can only be insured by the full recognition of the just claims of freedom and man. The Union was formed to establish justice, and secure the blessings of liberty. When it fails to accomplish these ends it will be worthless, and when it becomes worthless it cannot long endure.

We entreat you to be mindful of that fundamental maxim of democracy—equal rights and exact justice for all men. Do not submit to become agents in extending legalized oppression and systematized injustice over a vast territory yet exempt from these terrible evils.

We implore Christians and Christian ministers to interpose. Their divine religion requires them to behold in every man a brother, and to labor for the advancement and regeneration of the human race.

Whatever apologies may be offered for the toleration of slavery in the States, none can be urged for its extension into Territories where it does not exist, and where that extension involves the repeal of ancient law and the violation of solemn compact. Let all protest, earnestly and emphatically, by correspondence, through the press, by memorials, by resolutions of public meetings and legislative bodies, and in whatever other mode may seem expedient, against this enormous crime.

For ourselves, we shall resist it by speech and vote, and with all the abilities which God has given us. Even if overcome in the impending struggle, we shall not submit. We shall go home to our constituents, erect anew the standard of freedom, and call on the people to come to the rescue of the country from the domination of slavery. We will not despair; for the cause of human freedom is the cause of God.

S. P. CHASE, *Senator from Ohio.*
CHARLES SUMNER, *Senator from Mass.*
J. R. GIDDINGS, *Representative from Ohio.*
EDWARD WADE, *Representative from Ohio.*
GERRIT SMITH, *Representative from New York.*
ALEX. DE WITT, *Representative from Mass.*

Congressional Globe, Vol. XXVIII., 33 *Cong., I. Sess., Part I., pp.* 281, 282, (*Jan.* 30, 1854).

CHIEF JUSTICE TANEY

ROGER BROOKE TANEY was born in Calvert County, Md., March 17, 1777. He was graduated at Dickinson College in 1795 and admitted to the bar in 1799.

He was a Federalist originally, and opposed slavery in 1819. In 1824 he supported Jackson and in 1836 was appointed Chief Justice. The most noted of his decisions is that in the affair of Dred Scott. He died Oct. 12, 1864.

The facts of the Dred Scott case are given by Justice Taney below. The court by a vote of seven to two decided that taking a negro into a free territory or state did not necessarily make him free, that he could sue for freedom only under the state of his master, and that congress had no power to keep slavery out of the territories.

THE DRED SCOTT DECISION

We proceed, therefore, to inquire whether the facts relied on by the plaintiff entitled him to his freedom.

The case, as he himself states it on the record brought here by his writ of error, is this:

The plaintiff was a negro slave, belonging to Dr. Emerson, who was a surgeon in the army of the United States. In the year 1834 he took the plaintiff from the state of Missouri to the military post at Rock Island, in the state of Illinois, and held him there as a slave until the month of April or May, 1836. At the time last mentioned, said Dr. Emerson removed the plaintiff from said military post at Rock Island to the military post at Fort Snelling, situate on the west bank of the Mississippi river, in the territory known as Upper Louisiana, acquired by the United States of France, and situate north of the latitude of 36° 30′ north, and north of the state of Missouri. Said Dr. Emerson held the plaintiff in slavery at said Fort Snelling, from said last-mentioned date until the year 1838.

In the year 1835 Harriet, who is named in the second count of the plaintiff's declaration, was the negro slave of Major Taliaferro, who belonged to the army of the United States. In that year, 1835, said Major Taliaferro took said Harriet to said Fort Snelling, a military post, situate as hereinbefore stated, and kept her there as a slave until the year 1836, and then sold and delivered her as a slave, at said Fort Snelling, unto the said Dr. Emerson hereinbefore named. Said Dr. Emerson held said Harriet in slavery at said Fort Snelling until the year 1838.

In the year 1836 the plaintiff and Harriet intermarried at Fort Snelling, with the consent of Dr. Emerson, who then claimed to be their master and owner. Eliza and Lizzie, named in the third count of the plaintiff's declaration, are the fruit of that marriage. Eliza is about fourteen years old, and was born on board the steamboat Gipsey, north of the north line of the state of Missouri, and upon the river Mississippi. Lizzie is about seven years old, and was born in the state of Missouri, at the military post called Jefferson Barracks.

In the year 1838 said Dr. Emerson removed the plaintiff and said Harriet and their said daughter Eliza from said Fort Snelling to the state of Missouri, where they have ever since resided.

Before the commencement of this suit said Dr. Emerson sold and conveyed the plaintiff and Harriet, Eliza, and Lizzie, to the defendant, as slaves, and the defendant has ever since claimed to hold them, and each of them, as slaves.

In considering this part of the controversy, two questions arise: 1. Was he, together with his family, free in Missouri by reason of the stay in the territory of the United States hereinbefore mentioned? And 2. If they were not, is Scott himself free by reason of his removal to Rock Island, in the state of Illinois, as stated in the above admissions?

We proceed to examine the first question.

The act of Congress, upon which the plaintiff relies, declares that slavery and involuntary servitude, except as a punishment for crime, shall be forever prohibited in all that part of the territory ceded by France, under the name of Louisiana, which lies north of 36° 30′ north latitude, and not included within the limits of Missouri. And the difficulty which meets us at the threshold of this part of the inquiry is, whether Congress was authorized to pass this law under any of the powers granted to it by the Constitution; for if the authority is not given by that instrument, it is the duty of this court to declare it void

and inoperative, and incapable of conferring freedom upon anyone who is held as a slave under the laws of any one of the states.

The counsel for the plaintiff has laid much stress upon that article in the Constitution which confers on Congress the power to "dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States;" but, in the judgment of the court, that provision has no bearing on the present controversy, and the power there given, whatever it may be, is confined, and was intended to be confined, to the territory which at that time belonged to, or was claimed by, the United States, and was within their boundaries as settled by the treaty with Great Britain, and can have no influence upon a territory afterwards acquired from a foreign government. It was a special provision for a known and particular territory, and to meet a present emergency, and nothing more.

A brief summary of the history of the times, as well as the careful and measured terms in which the article is framed, will show the correctness of this proposition.

It will be remembered that, from the commencement of the Revolutionary war, serious difficulties existed between the states, in relation to the disposition of large and unsettled territories which were included in the chartered limits of some of the states. And some of the other states, and more especially Maryland, which had no unsettled lands, insisted that as the unoccupied lands, if wrested from Great Britain, would owe their preservation to the common purse and the common sword, the money arising from them ought to be applied in just proportion among the several states to pay the expenses of the war, and ought not to be appropriated to the use of the state in whose chartered limits they might happen to lie, to the exclusion of the other states, by whose combined efforts and common expense the territory was defended and preserved against the claim of the British government.

These difficulties caused much uneasiness during the war, while the issue was in some degree doubtful, and the future boundaries of the United States yet to be defined by treaty, if we achieved our independence.

The majority of the Congress of the confederation obviously concurred in opinion with the state of Maryland, and desired to obtain from the states which claimed it a cession of this territory, in order that Congress might raise money on this security to carry on the war. This appears by the resolution passed on the 6th of September, 1780, strongly

urging the states to cede these lands to the United States, both for the sake of peace and union among themselves, and to maintain the public credit; and this was followed by the resolution of October 10, 1780, by which Congress pledged itself, that if the lands were ceded, as recommended by the resolution above mentioned, they should be disposed of for the common benefit of the United States, and be settled and formed into distinct republican states, which should become members of the Federal Union, and have the same rights of sovereignty, and freedom, and independence, as other states.

But these difficulties became much more serious after peace took place and the boundaries of the United States were established. Every state at that time felt severely the pressure of its war debt; but in Virginia and some other states there were large territories of unsettled lands, the sale of which would enable them to discharge their obligations without much inconvenience; while other states, which had no such resource, saw before them many years of heavy and burdensome taxation; and the latter insisted, for the reasons before stated, that these unsettled lands should be treated as the common property of the states, and the proceeds applied to their common benefit.

The letters from the statesmen of that day will show how much this controversy occupied their thoughts, and the dangers that were apprehended from it. It was the disturbing element of the time, and fears were entertained that it might dissolve the confederation by which the states were then united.

These fears and dangers were, however, at once removed when the state of Virginia in 1784 voluntarily ceded to the United States the immense tract of country lying northwest of the river Ohio, and which was within the acknowledged limits of the state. The only object of the state in making this cession was to put an end to the threatening and exciting controversy, and to enable the Congress of that time to dispose of the lands and appropriate the proceeds as a common fund for the common benefit of the states. It was not ceded because it was inconvenient to the state to hold and govern it, nor from any expectation that it could be better or more conveniently governed by the United States.

The example of Virginia was soon afterwards followed by other states, and at the time of the adoption of the Constitution all of the states similarly situated had ceded their unappropriated lands, except North Carolina and Georgia. The main object for which these ces-

sions were desired and made, was on account of their money value, and to put an end to a dangerous controversy, as to who was justly entitled to the proceeds when the lands should be sold. It is necessary to bring this part of the history of these cessions thus distinctly into view, because it will enable us the better to comprehend the phraseology of the article in the Constitution so often referred to in the argument.

Undoubtedly the powers of sovereignty and the eminent domain were ceded with the land. This was essential in order to make it effectual and to accomplish its objects. But it must be remembered that at that time there was no government of the United States in existence with enumerated and limited powers; what was then called the United States were thirteen separate, sovereign, independent states, which had entered into a league or confederation for their mutual protection and advantage, and the Congress of the United States was composed of the representatives of these separate sovereignties, meeting together, as equals, to discuss and decide on certain measures which the states, by the Articles of Confederation, had agreed to submit to their decision. But this confederation had none of the attributes of sovereignty in legislative, executive or judicial power. It was little more than a congress of ambassadors, authorized to represent separate nations in matters in which they had a common concern.

It was this Congress that accepted the cession from Virginia. They had no power to accept it under the Articles of Confederation. But they had an undoubted right, as independent sovereignties, to accept any cession of territory for their common benefit, which all of them assented to; and it is equally clear that as their common property and having no superior to control them, they had the right to exercise absolute dominion over it, subject only to the restrictions which Virginia had imposed in her act of cession. There was, as we have said, no government of the United States then in existence with special enumerated and limited powers. The territory belonged to sovereignties who, subject to the limitations above mentioned, had a right to establish any form of government they pleased, by compact or treaty among themselves, and to regulate rights of person and rights of property in the territory, as they might deem proper. It was by a congress, representing the authority of these several and separate sovereignties, and acting under their authority and command (but not from any authority derived from the Articles of Confederation), that the instrument usually called the ordinance of 1787 was adopted; regulating in much detail the principles

and the laws by which this territory should be governed; and among other provisions slavery is prohibited in it. We do not question the power of the states, by agreement among themselves, to pass this ordinance, nor its obligatory force in the territory, while the confederation or league of the states in their separate sovereign character continued to exist.

This was the state of things when the Constitution of the United States was formed. The territory ceded by Virginia belonged to several confederated states as common property, and they had united in establishing in it a system of government and jurisprudence, in order to prepare it for admission as states, according to the terms of the cession. They were about to dissolve this federative Union, and to surrender a portion of their independent sovereignty to a new government which, for certain purposes, would make the people of the several states one people, and which was to be supreme and controlling within its sphere of action throughout the United States; but this government was to be carefully limited in its powers, and to exercise no authority beyond those expressly granted by the Constitution, or necessarily to be implied from the language of the instrument, and the objects it was intended to accomplish; and as this league of states would, upon the adoption of the new government, cease to have any power over the territory, and the ordinance they had agreed upon be incapable of execution, and a mere nullity, it was obvious that some provision was necessary to give the new government sufficient power to enable it to carry into effect the objects for which it was ceded, and the compacts and agreements which the states had made with each other in the exercise of their powers of sovereignty. It was necessary that the lands should be sold to pay the war debt; that a government and system of jurisprudence shouid be maintained in it to protect the citizens of the United States who should migrate to the territory, in their rights of person and of property. It was also necessary that the new government, about to be adopted, should be authorized to maintain the claim of the United States to the unappropriated lands in North Carolina and Georgia, which had not then been ceded, but the cession of which was confidently anticipated upon some terms that would be arranged between the general government and these two states. And, moreover, there were many articles of value besides this property in land, such as arms, military stores, munitions, and ships of war, which were the common property of the states, when acting in their independent characters as confederates, which neither the new

government nor anyone else would have a right to take possession of, or control, without authority from them; and it was to place these things under the guardianship and protection of the new government, and to clothe it with the necessary powers, that the clause was inserted in the Constitution which gives Congress the power to "dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States." It was intended for a specific purpose, to provide for the things we have mentioned. It was to transfer to the new government the property then held in common by the states, and to give to that government power to apply it to the objects for which it had been destined by mutual agreement among the states before their league was dissolved. It applied only to the property which the states held in common at that time, and has no reference whatever to any territory or other property which the new sovereignty might afterwards itself acquire.

The language used in the clause, the arrangement and combination of the powers, and the somewhat unusual phraseology it uses when it speaks of the political power to be exercised in the new government of the territory, all indicate the design and meaning of the clause to be such as we have mentioned. It does not speak of any territory, nor of territories, but uses language which, according to its legitimate meaning, points to a particular thing. The power is given in relation only to the territory of the United States; that is, to a territory then in existence, and then known or claimed as the territory of the United States. It begins its enumeration of powers by that of disposing, in other words, making sale of the lands, or raising money from them, which, as we have already said, was the main object of the cession, and which is accordingly the first thing provided for in the article. It then gives the power which was necessarily associated with the disposition and sale of the lands; that is, the power of making needful rules and regulations respecting the territory. And whatever construction may now be given to these words, everyone, we think, must admit that they are not the words usually employed by statesmen in giving supreme power of legislation. They are certainly very unlike the words used in the power granted to legislate over territory which the new government might afterwards itself obtain by cession from a state, either for its seat of government, or for forts, magazines, arsenals, dock yards, and other needful buildings.

And the same power of making needful rules respecting the terri-

tory is, in precisely the same language, applied to the other property belonging to the United States—associating the power over the territory in this respect with the power over movable or personal property—that is, the ships, arms, and munitions of war, which then belonged in common to the state sovereignties. And it will hardly be said that this power, in relation to the last-mentioned objects, was deemed necessary to be thus specially given to the new government in order to authorize it to make needful rules and regulations respecting the ships it might itself build, or arms and munitions of war it might itself manufacture or provide for the public service.

No one, it is believed, would think a moment of deriving the power of Congress to make needful rules and regulations in relation to property of this kind from this clause of the Constitution. Nor can it, upon any fair construction, be applied to any property but that which the new government was about to receive from the confederated states. And if this be true as to this property, it must be equally true and limited as to the territory, which is so carefully and precisely coupled with it—and like it, referred to as property in the power granted. The concluding words of the clause appear to render this construction irresistible; for, after the provisions we have mentioned, it proceeds to say, "that nothing in the Constitution shall be so construed as to prejudice any claims of the United States, or of any particular state."

Now, as we have before said, all of the states except North Carolina and Georgia had made the cession before the Constitution was adopted, according to the resolution of Congress of October 10, 1780. The claims of other states, that the unappropriated lands in these two states should be applied to the common benefit, in like manner was still insisted on, but refused by the states. And this member of the clause in question evidently applies to them, and can apply to nothing else. It was to exclude the conclusion that either party, by adopting the Constitution, would surrender what they deemed their rights. And when the latter provision relates so obviously to the unappropriated lands not yet ceded by the states, and the first clause makes provision for those then actually ceded, it is impossible by any just rule of construction to make the first provision general, and extend to all territories which the federal government might in any way afterwards acquire, when the latter is plainly and unequivocally confined to a particular territory; which was a part of the same controversy, and involved in the same dispute, and depended upon the same principles. The union of the two pro-

visions in the same clause shows that they were kindred subjects; and that the whole clause is local, and relates only to lands within the limits of the United States, which had been or then were claimed by a state; and that no other territory was in the mind of the framers of the Constitution or intended to be embraced in it. Upon any other construction it would be impossible to account for the insertion of the last provision in the place where it is found, or to comprehend why or for what object it was associated with the previous provision.

This view of the subject is confirmed by the manner in which the present government of the United States dealt with the subject as soon as it came into existence. It must be borne in mind that the same states that formed the confederation also formed and adopted the new government, to which so large a portion of their former sovereign powers were surrendered. It must also be borne in mind that all of these same states which had then ratified the new Constitution were represented in the Congress which passed the first law for the government of this territory; and many of the members of that legislative body had been deputies from the states under the confederation—had united in adopting the ordinance of 1787, and assisted in forming the new government under which they were then acting, and whose powers they were then exercising. And it is obvious, from the law they passed to carry into effect the principles and provisions of the ordinance, that they regarded it as the act of the states done in the exercise of their legitimate powers at the time. The new government took the territory as it found it and in the condition in which it was transferred, and did not attempt to undo anything that had been done. And, among the earliest laws passed under the new government, is one reviving the ordinance of 1787, which had become inoperative and a nullity upon the adoption of the Constitution. This law introduces no new form or principles for its government, but recites in the preamble that it is passed in order that this ordinance may continue to have full effect, and proceeds to make only those rules and regulations which were needful to adapt it to the new government, into whose hands the power had fallen. It appears, therefore, that this Congress regarded the purposes to which the land in this territory was to be applied, and the form of government and principles of jurisprudence which were to prevail there, while it remained in the territorial state, as already determined upon by the states, when they had full power and right to make the decision; and that the new government, having received it in this condition, ought to carry substan-

tially into effect the plans and principles which had been previously adopted by the states, and which no doubt the states anticipated when they surrendered their power to the new government. And if we regard this clause of the Constitution as pointing to this territory, with a territorial government already established in it, which had been ceded to the states for the purposes hereinbefore mentioned—every word in it is perfectly appropriate and easily understood, and the provisions it contains are in perfect harmony with the objects for which it was ceded, and with the condition of its government as a territory at the time. We can then easily account for the manner in which the first Congress legislated on the subject—and can also understand why this power over the territory was associated in the same clause with the other property of the United States, and subjected to the like power of making needful rules and regulations. But if the clause is construed in the expanded sense contended for, so as to embrace any territory acquired from a foreign nation by the present government, and to give it in such territory a despotic and unlimited power over persons and property, such as the confederated states might exercise in their common property, it would be difficult to account for the phraseology used, when compared with other grants of power—and also for its association with the other provisions in the same clause.

The Constitution has always been remarkable for the felicity of its arrangement of different subjects, and the perspicuity and appropriateness of the language it uses. But if this clause is construed to extend to territory acquired by the present government from a foreign nation outside of the limits of any charter from the British government to a colony, it would be difficult to say why it was deemed necessary to give the government the power to sell any vacant lands belonging to the sovereignty which might be found within it; and if this was necessary, why the grant of this power should precede the power to legislate over it and establish a government there; and still more difficult to say why it was deemed necessary so specially and particularly to grant the power to make needful rules and regulations in relation to any personal or movable property it might acquire there. For the words other property, necessarily, by every known rule of interpretation, must mean property of a different description from territory or land. And the difficulty would perhaps be insurmountable in endeavoring to account for the last member of the sentence, which provides that "nothing in this Constitution shall be so construed as to prejudice any claims of the

United States or any particular state," or to say how any particular state could have claims in or to a territory ceded by a foreign government, or to account for associating this provision with the preceding provisions of the clause, with which it would appear to have no connection.

The words "needful rules and regulations" would seem also to have been cautiously used for some definite object. They are not the words usually employed by statesmen, when they mean to give the powers of sovereignty, or to establish a government, or to authorize its establishment. Thus, in the law to renew and keep alive the ordinance of 1787, and to re-establish the government, the title of the law is: "An act to provide for the government of the territory northwest of the river Ohio." And in the Constitution, when granting the power to legislate over the territory that may be selected for the seat of government independently of a state, it does not say Congress shall have power "to make all needful rules and regulations respecting the territory;" but it declares that "Congress shall have power to exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular states and the acceptance of Congress, become the seat of the government of the United States."

The words "rules and regulations" are usually employed in the Constitution in speaking of some particular specified power which it means to confer on the government, and not, as we have seen, when granting general powers of legislation. As, for example, in the particular power to Congress "to make rules for the government and regulation of the land and naval forces, or the particular and specific power to regulate commerce;" "to establish an uniform rule of naturalization;" "to coin money and regulate the value thereof." And to construe the words of which we are speaking as a general and unlimited grant of sovereignty over territories which the government might afterwards acquire, is to use them in a sense and for a purpose for which they were not used in any other part of the instrument. But if confined to a particular territory, in which a government and laws had already been established, but which would require some alterations to adapt it to the new government, the words are peculiarly applicable and appropriate for that purpose.

The necessity of this special provision in relation to property and the rights or property held in common by the confederated states, is illustrated by the first clause of the sixth article. This clause provides that "all debts, contracts, and engagements entered into before the adop-

tion of this Constitution, shall be as valid against the United States under this government as under the confederation." This provision, like the one under consideration, was indispensable if the new Constitution was adopted. The new government was not a mere change in a dynasty, or in a form of government, leaving the nation or sovereignty the same, and clothed with all the rights and bound by all the obligations of the preceding one. But when the present United States came into existence under the new government it was a new political body, a new nation, then for the first time taking its place in the family of nations. It took nothing by succession from the confederation. It had no right, as its successor, to any property or rights of property which it had acquired, and was not liable for any of its obligations. It was evidently viewed in this light by the framers of the Constitution. And as the several states would cease to exist in their former confederated character upon the adoption of the Constitution, and could not, in that character, again assemble together, special provisions were indispensable to transfer to the new government the property and rights which at that time they held in common; and at the same time to authorize it to lay taxes and appropriate money to pay the common debt which they had contracted; and this power could only be given to it by special provisions in the Constitution. The clause in relation to the territory and other property of the United States provided for the first, and the clause last quoted provided for the other. They have no connection with the general powers and rights of sovereignty delegated to the new government, and can neither enlarge nor diminish them. They were inserted to meet a present emergency and not to regulate its powers as a government.

Indeed, a similar provision was deemed necessary in relation to treaties made by the confederation; and when in the clause next succeeding the one of which we have last spoken, it is declared that treaties shall be the supreme law of the land, care is taken to include, by express words, the treaties made by the confederated states. The language is: "and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land."

Whether, therefore, we take the particular clause in question, by itself or in connection with the other provisions of the Constitution, we think it clear that it applies only to the particular territory of which we have spoken, and cannot, by any just rule of interpretation, be extended to territory which the new government might afterwards obtain from a

foreign nation. Consequently, the power which Congress may have lawfully exercised in this territory while it remained under a territorial government, and which may have been sanctioned by judicial decision, can furnish no justification and no argument to support a similar exercise of power over territory afterwards acquired by the federal government. We put aside, therefore, any argument, drawn from precedents, showing the extent of the power which the general government exercised over slavery in this territory, as altogether inapplicable to the case before us.

But the case of the American and Ocean Insurance Companies *v.* Canter (1 Pet. 511) has been quoted as establishing a different construction of this clause of the Constitution. There is, however, not the slightest conflict between the opinion now given and the one referred to; and it is only by taking a single sentence out of the latter and separating it from the context, that even an appearance of conflict can be shown. We need not comment on such a mode of expounding an opinion of the court. Indeed it most commonly misrepresents instead of expounding it. And this is fully exemplified in the case referred to, where, if one sentence is taken by itself, the opinion would appear to be in direct conflict with that now given; but the words which immediately follow that sentence show that the court did not mean to decide the point, but merely affirmed the power of Congress to establish a government in the territory, leaving it an open question whether that power was derived from this clause in the Constitution, or was to be necessarily inferred from a power to acquire territory by cession from a foreign government. The opinion on this part of the case is short, and we give the whole of it to show how well the selection of a single sentence is calculated to mislead.

The passage referred to is in page 542, in which the court, in speaking of the power of Congress to establish a territorial government in Florida until it should become a state, uses the following language:

"In the meantime Florida continues to be a territory of the United States, governed by that clause of the Constitution which empowers Congress to make all needful rules and regulations respecting the territory or other property of the United States. Perhaps the power of governing a territory belonging to the United States, which has not, by becoming a state, acquired the means of self-government, may result, necessarily, from the fact that it is not within the jurisdiction of any particular state, and is within the power and jurisdiction of the United States. The right to govern may be the inevitable consequence of the right to acquire territory. Whichever may be the source from which the power is derived, the possession of it is unquestionable."

It is thus clear, from the whole opinion on this point, that the court

did not mean to decide whether the power was derived from the clause in the Constitution, or was the necessary consequence of the right to acquire. They do decide that the power in Congress is unquestionable, and in this we entirely concur, and nothing will be found in this opinion to the contrary. The power stands firmly on the latter alternative put by the court—that is, as "the inevitable consequence of the right to acquire territory."

And what still more clearly demonstrates that the court did not mean to decide the question, but leave it open for future consideration, is the fact that the case was decided in the Circuit Court by Mr. Justice Johnson, and his decision was affirmed by the Supreme Court. His opinion at the circuit is given in full in a note to the case, and in that opinion he states in explicit terms that the clause of the Constitution applies only to the territory then within the limits of the United States, and not to Florida, which had been acquired by cession from Spain. This part of his opinion will be found in the note in page 517 of the report. But he does not dissent from the opinion of the Supreme Court; thereby showing that, in his judgment, as well as that of the court, the case before them did not call for a decision on that particular point, and the court abstained from deciding it. And in a part of its opinion, subsequent to the passage we have quoted, where the court speak of the legislative power of Congress in Florida, they still speak with the same reserve. And in page 546, speaking of the power of Congress to authorize the territorial legislature to establish courts there, the court say: "They are legislative courts, created in virtue of the general right of sovereignty which exists in the government, or in virtue of that clause which enables Congress to make all needful rules and regulations respecting the territory belonging to the United States."

It has been said that the construction given to this clause is new, and now for the first time brought forward. The case of which we are speaking, and which has been so much discussed, shows that the fact is otherwise. It shows that precisely the same question came before Mr. Justice Johnson, at his circuit, thirty years ago—was fully considered by him, and the same construction given to the clause in the Constitution which is now given by this court. And that upon an appeal from his decision the same question was brought before this court, but was not decided because a decision upon it was not required by the case before the court.

There is another sentence in the opinion which has been com-

mented on, which even in a still more striking manner shows how one may mislead or be misled by taking out a single sentence from the opinion of a court, and leaving out of view what precedes and follows. It is in page 546, near the close of the opinion, in which the court say: "In legislating for them" (the territories of the United States), "Congress exercises the combined powers of the general and of a state government." And it is said that, as a state may unquestionably prohibit slavery within its own territory, this sentence decides in effect that Congress may do the same in a territory of the United States, exercising there the powers of a state, as well as the power of the general government.

The examination of this passage in the case referred to, would be more appropriate when we come to consider in another part of this opinion what power Congress can constitutionally exercise in a territory, over the rights of person or rights of property of a citizen. But, as it is in the same case with the passage we have before commented on, we dispose of it now, as it will save the court from the necessity of referring again to the case. And it will be seen upon reading the page in which this sentence is found, that it has no reference whatever to the power of Congress over rights of person or rights of property—but relates altogether to the power of establishing judicial tribunals to administer the laws constitutionally passed, and defining the jurisdiction they may exercise.

The law of Congress establishing a territorial government in Florida, provided that the legislature of the territory should have legislative powers over " all rightful objects of legislation; but no law should be valid which was inconsistent with the laws and Constitution of the United States."

Under the power thus conferred, the legislature of Florida passed an act erecting a tribunal at Key West to decide cases of salvage. And in the case of which we are speaking, the question arose whether the territorial legislature could be authorized by Congress to establish such a tribunal, with such powers; and one of the parties, among other objections, insisted that Congress could not under the Constitution authorize the legislature of the territory to establish such a tribunal with such powers, but that it must be established by Congress itself; and that a sale of cargo made under its order, to pay salvors, was void, as made without legal authority, and passed no property to the purchaser.

It is in disposing of this objection that the sentence relied on occurs,

and the court begin that part of the opinion by stating with great precision the point which they are about to decide.

They say: "It has been contended that, by the Constitution of the United States, the judicial power of the United States extends to all cases of admiralty and maritime jurisdiction; and that the whole of the judicial power must be vested 'in one Supreme Court, and in such inferior courts as Congress shall from time to time ordain and establish.' Hence it has been argued that Congress cannot vest admiralty jurisdiction in courts created by the territorial legislature."

And after thus clearly stating the point before them, and which they were about to decide, they proceeded to show that these territorial tribunals were not constitutional courts, but merely legislative, and that Congress might, therefore, delegate the power to the territorial government to establish the court in question; and they conclude that part of the opinion in the following words: "Although admiralty jurisdiction can be exercised in the states in those courts only which are established in pursuance of the third article of the Constitution, the same limitation does not extend to the territories. In legislating for them, Congress exercises the combined powers of the general and state governments."

Thus it will be seen by these quotations from the opinion that the court, after stating the question it was about to decide in a manner too plain to be misunderstood, proceeded to decide it, and announced as the opinion of the tribunal that, in organizing the judicial department of the government in a territory of the United States, Congress does not act under, and is not restricted by, the third article in the Constitution, and is not bound, in a territory, to ordain and establish courts in which the judges hold their offices during good behavior but may exercise discretionary power which a state exercises in establishing its judicial department, and regulating the jurisdiction of its courts, and may authorize the territorial government to establish, or may itself establish, courts in which the judges hold their offices for a term of years only; and may vest in them judicial power upon subjects confided to the judiciary of the United States. And in doing this, Congress undoubtedly exercises the combined power of a general and a state government. It exercises the discretionary power of a state government in authorizing the establishment of a court in which the judges hold their appointments for a term of years only, and not during good behavior; and it exercises the power of the general government in investing that court with admiralty

jurisdiction, over which the general government had exclusive jurisdiction in the territory.

No one, we presume, will question the correctness of that opinion; nor is there anything in conflict with it in the opinion now given. The point decided in the case cited has no relation to the question now before the court. That depended on the construction of the third article of the Constitution, in relation to the judiciary of the United States, and the power which Congress might exercise in a territory in organizing the judicial department of the government. The case before us depends upon other and different provisions of the Constitution, altogether separate and apart from the one above mentioned. The question as to what courts Congress may ordain or establish in a territory to administer laws which the Constitution authorizes it to pass, and what laws it is or is not authorized by the Constitution to pass, are widely different—are regulated by different and separate articles of the Constitution, and stand upon different principles. And we are satisfied that no one who reads attentively the page in Peters' Reports to which we have referred, can suppose that the attention of the court was drawn for a moment to the question now before this court, or that it meant in that case to say that Congress had a right to prohibit a citizen of the United States from taking any property which he lawfully held into a territory of the United States.

This brings us to examine by what provision of the Constitution the present federal government, under its delegated and restricted powers, is authorized to acquire territory outside of the original limits of the United States, and what powers it may exercise therein over the person or property of a citizen of the United States, while it remains a territory, and until it shall be admitted as one of the states of the Union.

There is certainly no power given by the Constitution to the federal government to establish or maintain colonies bordering on the United States or at a distance, to be ruled and governed at its own pleasure; nor to enlarge its territorial limits in any way, except by the admission of new states. That power is plainly given; and if a new state is admitted, it needs no further legislation by Congress, because the Constitution itself defines the relative rights, and powers, and duties of the state, and the citizens of the state, and the federal government. *But no power is given to acquire a territory to be held and governed permanently in that character.*

And indeed the power exercised by Congress to acquire territory

and establish a government there, according to its own unlimited discretion, was viewed with great jealousy by the leading statesmen of the day. And in the Federalist (No. 38), written by Mr. Madison, he speaks of the acquisition of the Northwest Territory by the confederated states, by the cession from Virginia, and the establishment of a government there, as an exercise of power not warranted by the Articles of Confederation and dangerous to the liberties of the people. And he urges the adoption of the Constitution as a security and safeguard against such an exercise of power.

We do not mean, however, to question the power of Congress in this respect. The power to expand the territory of the United States by the admission of new states is plainly given; and in the construction of this power by all the departments of the government, it has been held to authorize the acquisition of territory, not fit for admission at the time, but to be admitted as soon as its population and situation would entitle it to admission. It is acquired to become a state, and not to be held as a colony and governed by Congress with absolute authority; and as the propriety of admitting a new state is committed to the sound discretion of Congress, the power to acquire territory for that purpose, to be held by the United States until it is in a suitable condition to become a state upon an equal footing with the other states, must rest upon the same discretion. It is a question for the political department of the government, and not the judicial; and whatever the political department of the government shall recognize as within the limits of the United States, the judicial department is also bound to recognize, and to administer in it the laws of the United States, so far as they apply, and to maintain in the territory the authority and rights of the government, and also the personal rights and rights of property of individual citizens, as secured by the Constitution. All we mean to say on this point is that, as there is no express regulation in the Constitution defining the power which the general government may exercise over the person or property of a citizen in a territory thus acquired, the court must necessarily look to the provisions and principles of the Constitution, and its distribution of powers, for the rules and principles by which its decision must be governed.

Taking this rule to guide us, it may be safely assumed that citizens of the United States who migrate to a territory belonging to the people of the United States, cannot be ruled as mere colonists, dependent upon the will of the general government, and to be governed by any

laws it may think proper to impose. The principle upon which our governments rest, and upon which alone they continue to exist, is the union of states, sovereign and independent within their own limits in their internal and domestic concerns, and bound together as one people by a general government, possessing certain enumerated and restricted powers, delegated to it by the people of the several states, and exercising supreme authority within the scope of the powers granted to it throughout the dominion of the United States. A power, therefore, in the general government to obtain and hold colonies and dependent territories, over which they might legislate without restriction, would be inconsistent with its own existence in its present form. Whatever it acquires, it acquires for the benefit of the people of the several states who created it. It is their trustee acting for them, and charged with the duty of promoting the interests of the whole people of the Union in the exercise of the powers specifically granted.

At the time when the territory in question was obtained by cession from France it contained no population fit to be associated together and admitted as a state; and it therefore was absolutely necessary to hold possession of it, as a territory belonging to the United States, until it was settled and inhabited by a civilized community capable of self-government, and in a condition to be admitted on equal terms with the other states as a member of the Union. But, as we have before said, it was acquired by the general government, as the representative and trustee of the people of the United States, and it must therefore be held in that character for their common and equal benefit; for it was the people of the several states, acting through their agent and representative, the federal government, who in fact acquired the territory in question, and the government holds it for their common use until it shall be associated with the other states as a member of the Union.

But until that time arrives, it is undoubtedly necessary that some government should be established, in order to organize society, and to protect the inhabitants in their persons and property; and as the people of the United States could act in this matter only through the government which represented them, and through which they spoke and acted when the territory was obtained, it was not only within the scope of its powers, but it was its duty to pass such laws and establish such a government as would enable those, by whose authority they acted, to reap the advantages anticipated from its acquisition, and to gather there a population which would enable it to assume the position to which it was

destined among the states of the Union. The power to acquire necessarily carries with it the power to preserve and apply to the purposes for which it was acquired. The form of government to be established necessarily rested in the discretion of Congress. It was their duty to establish the one that would be best suited for the protection and security of the citizens of the United States, and other inhabitants who might be authorized to take up their abode there, and that must always depend upon the existing condition of the territory, as to the number and character of its inhabitants, and their situation in the territory. In some cases a government, consisting of persons appointed by the federal government, would best subserve the interests of the territory, when the inhabitants were few and scattered, and new to one another. In other instances, it would be more advisable to commit the powers of self-government to the people who had settled in the territory, as being the most competent to determine what was best for their own interests. But some form of civil authority would be absolutely necessary to organize and preserve civilized society, and prepare it to become a state; and what is the best form must always depend on the condition of the territory at the time, and the choice of the mode must depend upon the exercise of a discretionary power by Congress, acting within the scope of its constitutional authority, and not infringing upon the rights of person or rights of property of the citizen who might go there to reside, or for any other lawful purpose. It was acquired by the exercise of this discretion, and it must be held and governed in like manner, until it is fitted to be a state.

But the power of Congress over the person or property of a citizen can never be a mere discretionary power under our Constitution and form of government. The powers of the government and the rights and privileges of the citizen are regulated and plainly defined by the Constitution itself. And when the territory becomes a part of the United States, the federal government enters into possession in the character impressed upon it by those who created it. It enters upon it with its powers over the citizen strictly defined, and limited by the Constitution, from which it derives its own existence, and by virtue of which alone it continues to exist and act as a government and sovereignty. It has no power of any kind beyond it; and it cannot, when it enters a territory of the United States, put off its character, and assume discretionary or despotic powers which the Constitution has denied to it. It cannot create for itself a new character separated from the citizens of

the United States, and the duties it owes them under the provisions of the Constitution. *The territory being a part of the United States, the government and the citizen both enter it under the authority of the Constitution, with their respective rights defined and marked out; and the federal government can exercise no power over his person or property, beyond what that instrument confers, nor lawfully deny any right which it has reserved.*

A reference to a few of the provisions of the Constitution will illustrate this proposition.

For example, no one, we presume, will contend that Congress can make any law in a territory respecting the establishment of religion, or the free exercise thereof, or abridging the freedom of speech or of the press, or the right of the people of the territory peaceably to assemble, and to petition the government for the redress of grievances.

Nor can Congress deny to the people the right to keep and bear arms, nor the right to trial by jury, nor compel any one to be a witness against himself in a criminal proceeding.

These powers, and others, in relation to rights of person, which it is not necessary here to enumerate, are, in express and positive terms, denied to the general government; and the rights of private property have been guarded with equal care. Thus the rights of property are united with the rights of person, and placed on the same ground by the fifth amendment to the Constitution, which provides that no person shall be deprived of life, liberty, and property, without due process of law. And an act of Congress which deprives a citizen of the United States of his liberty or property, merely because he came himself or brought his property into a particular territory of the United States, and who had committed no offence against the laws, could hardly be dignified with the name of due process of law.

So, too, it will hardly be contended that Congress could by law quarter a soldier in a house in a territory without the consent of the owner, in time of peace; nor in time of war, but in a manner prescribed by law. Nor could they by law forfeit the property of a citizen in a territory who was convicted of treason, for a longer period than the life of the person convicted; nor take private property for public use without just compensation.

The powers over person and property of which we speak are not only not granted in Congress, but are in express terms denied, and they are forbidden to exercise them. And this prohibition is not confined

to the states, but the words are general, and extend to the whole territory over which the Constitution gives it power to legislate, including those portions of it remaining under territorial government, as well as that covered by states. It is a total absence of power everywhere within the dominion of the United States, and places the citizens of a territory, so far as these rights are concerned, on the same footing with citizens of the states, and guards them as firmly and plainly against any inroads which the general government might attempt, under the plea of implied or incidental powers. And if Congress itself cannot do this—if it is beyond the powers conferred on the federal government—it will be admitted, we presume, that it could not authorize a territorial government to exercise them. It could confer no power on any local government, established by its authority, to violate the provisions of the Constitution.

It seems, however, to be supposed, that there is a difference between property in a slave and other property, and that different rules may be applied to it in expounding the Constitution of the United States. And the laws and usages of nations, and the writings of eminent jurists upon the relation of master and slave and their mutual rights and duties, and the powers which governments may exercise over it, have been dwelt upon in the argument.

But in considering the question before us, it must be borne in mind that there is no law of nations standing between the people of the United States and their government, and interfering with their relation to each other. The powers of the government, and the rights of the citizen under it, are positive and practical regulations plainly written down. The people of the United States have delegated to it certain enumerated powers, and forbidden it to exercise others. It has no power over the person or property of a citizen but what the citizens of the United States have granted. And no laws or usages of other nations, or reasoning of statesmen or jurists upon the relations of master and slave, can enlarge the powers of the government, or take from the citizens the rights they have reserved. And if the Constitution recognises the right of property of the master in a slave, and makes no distinction between that description of property and other property owned by a citizen, no tribunal, acting under the authority of the United States, whether it be legislative, executive, or judicial, has a right to draw such a distinction, or deny to it the benefit of the provisions and guarantees which have been provided for the protection of private property against the encroachments of the government.

Now, as we have already said in an earlier part of this opinion, upon a different point, the right of property in a slave is distinctly and expressly affirmed in the Constitution. The right to traffic in it, like an ordinary article of merchandise and property, was guaranteed to the citizens of the United States, in every state that might desire it, for twenty years. And the government in express terms is pledged to protect it in all future time, if the slave escapes from his owner. This is done in plain words—too plain to be misunderstood. And no word can be found in the Constitution which gives Congress a greater power over slave property, or which entitles property of that kind to less protection than property of any other description. The only power conferred is the power coupled with the duty of guarding and protecting the owner in his rights.

Upon these considerations, it is the opinion of the court that *the act of Congress which prohibited a citizen from holding and owning property of this kind in the territory of the United States north of the line therein mentioned, is not warranted by the Constitution, and is therefore void;* and that neither Dred Scott himself nor any of his family were made free by being carried into this territory; even if they had been carried there by the owner, with the intention of becoming a permanent resident.

We have so far examined the case, as it stands under the Constitution of the United States, and the powers thereby delegated to the federal government.

But there is another point in the case which depends on state power and state law. And it is contended on the part of the plaintiff that he is made free by being taken to Rock Island, in the state of Illinois, independently of his residence in the territory of the United States; and being so made free, he was not again reduced to a state of slavery by being brought back to Missouri.

Our notice of this part of the case will be very brief; for the principle on which it depends was decided in this court, upon much consideration, in the case of Strader *et al. v.* Graham, reported in 10th Howard, 82. In that case the slaves had been taken from Kentucky to Ohio, with the consent of the owner, and afterwards brought back to Kentucky. And this court held that their *status* or condition as free or slave depended upon the laws of Kentucky when they were brought back into that state and not of Ohio; and that this court had no jurisdiction to revise the judgment of a state court upon its own laws. This

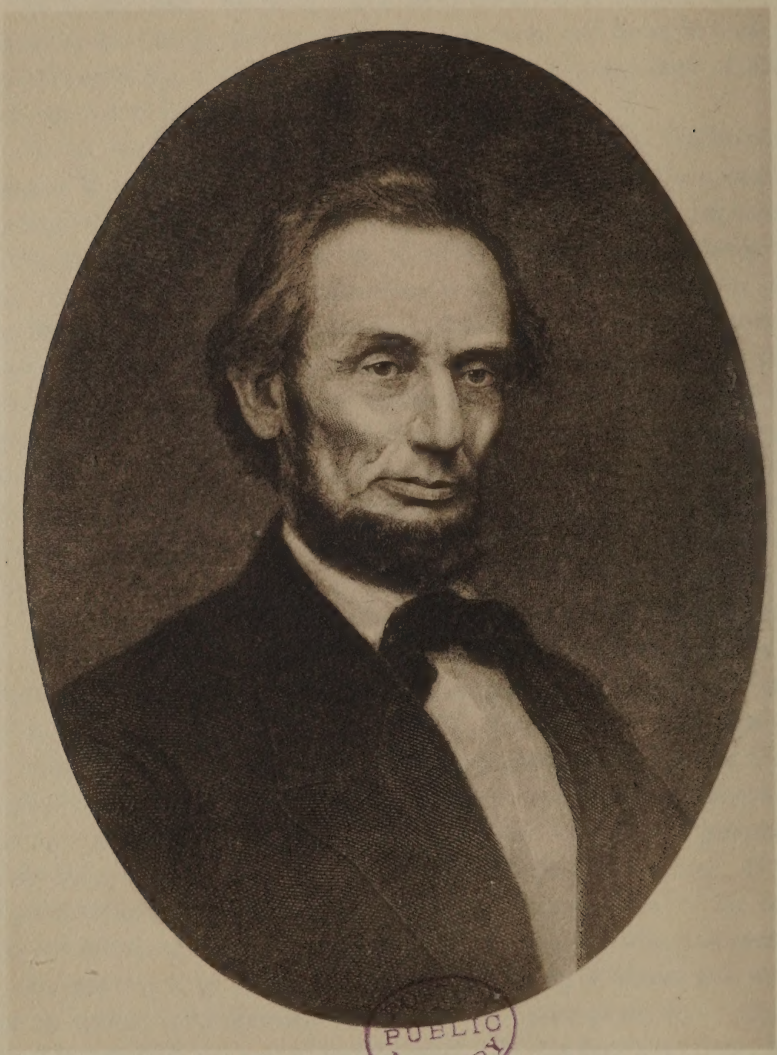
was the point directly before the court, and the decision that this court had not jurisdiction turned upon it, as will be seen by the report of the case.

So in this case. As Scott was a slave when taken into the state of Illinois by his owner, and was there held as such, and brought back in that character, his *status* as free or slave depended on the laws of Missouri and not of Illinois.

It has, however, been urged in the argument that by the laws of Missouri he was free on his return, and that this case, therefore, cannot be governed by the case of Strader *et al. v.* Graham, where it appeared, by the laws of Kentucky, that the plaintiffs continued to be slaves on their return from Ohio. But whatever doubts or opinions may at one time have been entertained upon this subject, we are satisfied, upon a careful examination of all the cases decided in the state courts of Missouri referred to, that it is now firmly settled by the decisions of the highest court in the state, that Scott and his family upon their return were not free, but were by the laws of Missouri the property of the defendant; and that the Circuit Court of the United States had no jurisdiction when by the laws of the state the plaintiff was a slave and not a citizen.

Moreover, the plaintiff, it appears, brought a similar action against the defendant in the state court of Missouri, claiming the freedom of himself and family upon the same grounds and the same evidence upon which he relies in the case before the court. The case was carried before the Supreme Court of the state; was fully argued there; and that court decided that neither the plaintiff nor his family were entitled to freedom, and were still the slaves of the defendant; and reversed the judgment of the inferior state court, which had given a different decision. If the plaintiff supposed that this judgment of the Supreme Court of the state was erroneous, and that this court had jurisdiction to revise and reverse it, the only mode by which he could legally bring it before this court was by writ of error directed to the Supreme Court of the state, requiring it to transmit the record to this court. If this had been done, it is too plain for argument that the writ must have been dismissed for want of jurisdiction in this court. The case of Strader and others *v.* Graham is directly in point; and, indeed, independent of any decision, the language of the 25th section of the act of 1789 is too clear and precise to admit of controversy.

But the plaintiff did not pursue the mode prescribed by law for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ABRAHAM LINCOLN

bringing the judgment of a state court before this court for revision, but suffered the case to be remanded to the inferior state court, where it is still continued, and is, by agreement of the parties, to await the judgment of this court on the point. All of this appears on the record before us, and by the printed report of the case.

And while the case is yet open and pending in the inferior state court, the plaintiff goes into the Circuit Court of the United States, upon the same case and the same evidence, and against the same party, and proceeds to judgment, and then brings here the same case from the Circuit Court which the law would not have permitted him to bring directly from the state court. And if this court takes jurisdiction in this form, the result, so far as the rights of the respective parties are concerned, is in every respect substantially the same as if it had in open violation of the law entertained jurisdiction over the judgment of the state court upon a writ of error, and revised and reversed its judgment upon the ground that its opinion upon the question of law was erroneous. It would ill become this court to sanction such an attempt to evade the law, or to exercise an appellate power in this circuitous way, which it is forbidden to exercise in the direct and regular and invariable forms of judicial proceedings.

Upon the whole, therefore, it is the judgment of this court that it appears by the record before us that the plaintiff in error is not a citizen of Missouri, in the sense in which that word is used in the Constitution; and that the Circuit Court of the United States for that reason had no jurisdiction in the case and could give no judgment in it. Its judgment for the defendant must consequently be reversed and a mandate issued, directing the suit to be dismissed for want of jurisdiction.

ABRAHAM LINCOLN

Abraham Lincoln was born in Hardin County, Kentucky, February 12, 1809. He grew up in a log cabin, and his school education covered only a little of the three R's. All his great education and training he afterwards acquired by himself.

In 1818 his mother died and his father remarried the next year.

In 1828 he made a trip to New Orleans as bow-hand on a flatboat. In 1830 he moved to Illinois with his father, built a cabin, split rails, and in 1831 again made a trip to New Orleans by flatboat.

On his return he settled at New Salem, Illinois. He was successively clerk of a country store, captain in the Black Hawk War, unsuccessful candidate for the legislature, postmaster, storekeeper, surveyor, and from 1834 to 1840 was elected to the legislature.

In 1836 he was admitted to the bar, and the next year removed to Springfield. In 1846-48 he served one term in the U. S. House of Representatives. For the next five years he devoted himself almost entirely to his law practice.

Douglas brought forward his celebrated "squatter sovereignty" bill in 1854. It abrogated the Missouri Compromise of 1820, and aroused the Northern opponents of slavery. Lincoln's speech at the State Fair in Springfield in 1854 made him one of the leaders of the anti-Nebraska forces. He was a prominent candidate for the Senate in 1855, but four anti-Nebraska democrats forced the election of Trumbull.

In 1854 the Republican party rapidly sprang into being in Maine and the North Central States, and in 1856 was formally organized in Pittsburg on Washington's birthday. At the National Convention at Philadelphia in June, Lincoln was a prominent candidate for the Vice-Presidential nomination. The keynote of the party platform was "no extension of slavery." The vote the new party polled for Fremont was astonishingly large.

In 1858 the Dred Scott Decision intensified the situation. Douglas and Lincoln met in their famous joint debates in seven important towns in the State. Douglas defended "squatter sovereignty," and declared himself willing to accept the Supreme Court as the final authority. Lincoln attacked the extension of slavery, "squatter sovereignty," and declared that the Republicans would see to it that the decision be reversed. It is a matter of interest that the Supreme Court reflects the sentiment of the majority of some years back. Thus Marshall, appointed by Washington, opposed the state-loving Republicanism of 1804-1835, and Taney, appointed as a Jacksonian Democrat, opposed the growing sentiment against slavery in the North. Lincoln, lover of the Union as he was, refused to abide by the present decision and left it for Douglas to stand by the principle developed by Marshall and Webster that the authority of the Supreme Court is final.

This series of debates made Lincoln the logical candidate in the

North against Douglas in 1860, and the fact that he had forced Douglas to stand by the principle that a territory could keep out slavery broke the Democratic party in two.

Lincoln's election, the conduct of the war, the emancipation of the slaves, and his death are a well-known part of our history.

He was a great statesman, a shrewd organizer, an orator whose style is classic for simple, forcible prose, and a genius in his understanding of men.

AGAINST "SQUATTER SOVEREIGNTY" AND THE DRED SCOTT DECISION

IN REPLY TO SENATOR DOUGLAS

Delivered at Chicago, Saturday Evening, July 10, 1858. (*Mr. Douglas was not present.*)

[Mr. Lincoln was introduced by C. L. Wilson, Esq.; and as he made his appearance he was greeted with a perfect storm of applause. For some moments the enthusiasm continued unabated. At last when by a wave of the hand partial silence was restored, Mr. Lincoln said:—]

My Fellow-Citizens: On yesterday evening, upon the occasion of the reception given to Senator Douglas, I was furnished with a seat very convenient for hearing him, and was otherwise very courteously treated by him and his friends, and for which I thank him and them. During the course of his remarks my name was mentioned in such a way as, I suppose, renders it at least not improper that I should make some sort of a reply to him. I shall not attempt to follow him in the precise order in which he addressed the assembled multitude upon that occasion, though I shall perhaps do so in the main.

There was one question to which he asked the attention of the crowd, which I deem of somewhat less importance—at least of propriety for me to dwell upon—than the others, which he brought in near the close of his speech, and which I think it would not be entirely proper for me to omit attending to, and yet if I were not to give some attention to it now, I should probably forget it altogether. While I am upon this subject, allow me to say that I do not intend to indulge in that inconvenient mode sometimes adopted in public speaking, of reading from documents; but I shall depart from that rule so far as to read a little scrap from his speech, which notices this first topic of which I shall speak—that is, provided I can find it in the paper.

"I have made up my mind to appeal to the people against the combination that has been made against me; the Republican leaders having formed an alliance—an unholy and unnatural alliance—with a portion of unscrupulous Federal office-holders. I intend to fight that allied army wherever I meet them. I know they deny the alliance; but yet these men who are trying to divide the Democratic party for the purpose of electing a Republican senator in my place are just as much the agents and tools of the supporters of Mr. Lincoln. Hence I shall deal with this allied army just as the Russians dealt with the allies at Sebastopol —that is, the Russians did not stop to inquire, when they fired a broadside, whether it hit an Englishman, a Frenchman, or a Turk. Nor will I stop to inquire, nor shall I hesitate, whether my blows shall hit the Republican leaders or their allies, who are holding the Federal offices, and yet acting in concert with them."

Well, now, gentlemen, is not that very alarming? Just to think of it! right at the outset of his canvass I, a poor, "kind, amiable, intelligent gentleman"—I am to be slain in this way! Why, my friends, the Judge is not only, as it turns out, not a dead lion, nor even a living one —he is the rugged Russian Bear! [Laughter and applause.]

But if they will have it—for he says that we deny it—that there is any such alliance, as he says there is—and I don't propose hanging very much upon this question of veracity—but if he will have it that there is such an alliance—that the administration men and we are allied, and we stand in the attitude of English, French, and Turk, he occupying the position of the Russian, in that case I beg that he will indulge us while we barely suggest to him that these allies took Sebastopol. [Great applause.]

Gentlemen, only a few more words as to this alliance. For my part, I have to say that whether there be such an alliance depends, so far as I know, upon what may be a right definition of the term "alliance." If for the Republican party to see the other great party to which they are opposed, divided among themselves, and not try to stop the division, and rather be glad of it—if that is an alliance; I confess I am in; but if it is meant to be said that the Republicans had formed an alliance going beyond that, by which there is contribution of money or sacrifice of principle on the one side or the other, so far as the Republican party is concerned—if there be any such thing, I protest that I neither know anything of it, nor do I believe it. I will, however, say—as I think this branch of the argument is lugged in—I would before I leave it, state, for the benefit of those concerned, that one of those same Buchanan men did once tell me of an argument that he made for his opposition to Judge Douglas. He said that a friend of our Senator Douglas had been talking to him, and had, among other things, said to

him: "Why, you don't want to beat Douglas?" "Yes," said he, "I do want to beat him, and will tell you why. I believe his original Nebraska bill was right in the abstract, but it was wrong in the time that it was brought forward. It was wrong in the application to a territory in regard to which the question had been settled; it was brought forward at a time when nobody asked him; it was tendered to the South when the South had not asked for it, but when they could not well refuse it; and for this same reason he forced that question upon our party. It has sunk the best men all over the nation, everywhere; and now, when our President, struggling with the difficulties of this man's getting up, has reached the very hardest point to turn in the case, he deserts him, and I am for putting him where he will trouble us no more."

Now, gentlemen, that is not my argument; that is not my argument at all. I have only been stating to you the argument of a Buchanan man. You will judge if there is any force in it.

"WHAT IS POPULAR SOVEREIGNTY?"

"Popular Sovereignty!" everlasting "Popular Sovereignty!" Let us a moment inquire into this vast matter of Popular Sovereignty. What is Popular Sovereignty? We recollect that at an early period in the history of this struggle there was another name for the same thing—"Squatter Sovereignty." It was not exactly Popular Sovereignty, but Squatter Sovereignty. What do those terms mean? What do those terms mean when used now? And vast credit is taken by our friend the Judge in regard to his support of it, when he declares the last years of his life have been, and all the future years of his life shall be, devoted to this matter of Popular Sovereignty. What is it? Why, it is the sovereignty of the people. What was Squatter Sovereignty? I suppose if it had any significance at all, it was the right of the people to govern themselves, to be sovereign in their own affairs while they were squatted down in a country not their own, while they had squatted on a territory that did not belong to them, in the sense that a state belongs to the people who inhabit it—when it belonged to the nation; such right to govern themselves was called "Squatter Sovereignty."

Now, I wish you to mark. What has become of that Squatter Sovereignty? What has become of it? Can you get anybody to tell you now that the people of a territory have any authority to govern themselves, in regard to this mooted question of slavery, before they form a state constitution? No such thing at all, although there is a general running fire, and although there has been a hurrah made in every speech on that

side, assuming that policy had given the people of a territory the right to govern themselves upon this question; yet the point is dodged. To-day it has been decided—no more than a year ago it was decided by the Supreme Court of the United States, and is insisted upon to-day—that the people of a territory have no right to exclude slavery from a territory; that if any one man chooses to take slaves into a territory, all the rest of the people have no right to keep them out. This being so, and this decision being made one of the points that the Judge approved, and one in the approval of which he says he means to keep me down—put me down I should not say, for I have never been up. He says he is in favor of it, and sticks to it, and expects to win his battle on that decision, which says that there is no such thing as Squatter Sovereignty, but that any one man may take slaves into a territory, and all the other men in the territory may be opposed to it, and yet by reason of the Constitution they cannot prohibit it. When that is so, how much is left of this vast matter of Squatter Sovereignty, I should like to know? [A voice: "It is all gone."]

When we get back, we get to the point of the right of the people to make a constitution. Kansas was settled, for example, in 1854. It was a territory yet, without having formed a constitution, in a very regular way, for three years. All this time negro slavery could be taken in by any few individuals, and by that decision of the Supreme Court, which the Judge approves, all the rest of the people cannot keep it out; but when they come to make a constitution they may say they will not have slavery. But it is there; they are obliged to tolerate it some way, and all experience shows it will be so, for they will not take the negro slaves and absolutely deprive the owners of them. All experience shows this to be so. All that space of time that runs from the beginning of the settlement of the territory until there is sufficiency of people to make a state constitution—all that portion of time Popular Sovereignty is given up. The seal is absolutely put down upon it by the court decision, and Judge Douglas puts his own upon the top of that; yet he is appealing to the people to give him vast credit for his devotion to Popular Sovereignty. [Applause.]

Again, when we get to the question of the right of the people to form a state constitution as they please, to form it with slavery or without slavery—if that is anything new, I confess I don't know it. Has there ever been a time when anybody said that any other than the people of a territory itself should form a constitution? What is now in it that

Judge Douglas should have fought several years of his life, and pledge himself to fight all the remaining years of his life, for? Can Judge Douglas find anybody on earth that said that anybody else should form a constitution for a people? [A voice, "Yes."] Well, I should like you to name him; I should like to know who he was. [Same voice, "John Calhoun."]

Mr. Lincoln.—No, sir, I never heard of even John Calhoun saying such a thing. He insisted on the same principle as Judge Douglas; but his mode of applying it, in fact, was wrong. It is enough for my purpose to ask this crowd whenever a Republican said anything against it. They never said anything against it, but they have constantly spoken for it; and whoever will undertake to examine the platform, and the speeches of responsible men of the party, and of irresponsible men, too, if you please, will be unable to find one word from anybody in the Republican ranks opposed to that Popular Sovereignty which Judge Douglas thinks that he has invented. I suppose that Judge Douglas will claim in a little while that he is the inventor of the idea that the people should govern themselves; that nobody ever thought of such a thing until he brought it forward!

We do not remember that in that old Declaration of Independence it is said that "We hold these truths to be self-evident, that all men are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness; that to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed." There is the origin of Popular Sovereignty. [Loud applause] Who, then, shall come in at this day and claim that he invented it?

THE LECOMPTON CONSTITUTION

The Lecompton Constitution connects itself with this question, for it is in this matter of the Lecompton Constitution that our friend Judge Douglas claims such vast credit. I agree that in opposing the Lecompton Constitution, so far as I can perceive, he was right. I do not deny that at all; and, gentlemen, you will readily see why I could not deny it, even if I wanted to. But I do not wish to; for all the Republicans in the nation opposed it, and they would have opposed it just as much without Judge Douglas's aid as with it. They had all taken ground against it long before he did. Why, the reason that he urges against that Constitution, I urged against him a year before. I have the printed speech

in my hand. The argument that he makes, why that Constitution should not be adopted, that the people were not fairly represented nor allowed to vote, I pointed out in a speech a year ago, which I hold in my hand now, that no fair chance was to be given to the people. ["Read it, Read it."] I shall not waste your time by trying to read it. ["Read it, Read it."] Gentlemen, reading from speeches is a very tedious business, particularly for an old man that has to put on spectacles, and more so if the man be so tall that he has to bend over to the light.

A little more now as to this matter of Popular Sovereignty and the Lecompton Constitution. The Lecompton Constitution, as the Judge tells us, was defeated. The defeat of it was a good thing, or it was not. He thinks the defeat of it was a good thing, and so do I, and we agree in that. Who defeated it?

A Voice.—Judge Douglas.

Mr. Lincoln.—Yes, he furnished himself, and if you suppose he controlled the other Democrats that went with him, he furnished three votes; while the Republicans furnished twenty.

That is what he did to defeat it. In the House of Representatives he and his friends furnished some twenty votes, and the Republicans furnished ninety odd. Now who was it that did the work?

A Voice.—Douglas.

Mr. Lincoln.—Why, yes, Douglas did it! To be sure he did.

Let us, however, put that proposition another way. The Republicans could not have done it without Judge Douglas. Could he have done it without them? Which could have come the nearest to doing it without the other?

A Voice.—Who killed the bill?

Another Voice.—Douglas.

Mr. Lincoln.—Ground was taken against it by the Republicans long before Douglas did it. The proportion of the opposition to that measure is about five to one.

A Voice.—Why don't they come out on it?

Mr. Lincoln.—You don't know what you are talking about, my friend. I am quite willing to answer any gentleman in the crowd who asks an intelligent question.

Now, who in all this country has ever found any of our friends of Judge Douglas's way of thinking, and who have acted upon this main question, that has ever thought of uttering a word in behalf of Judge Trumbull?

A Voice.—We have.

Mr. Lincoln.—I defy you to show a printed resolution passed in a Democratic meeting—I take it upon myself to defy any man to show a printed resolution of a Democratic meeting, large or small—in favor of Judge Trumbull, or any of the five to one Republicans who beat that bill. Everything must be for the Democrats! They did everything, and the five to one that really did the thing, they snub over; and they do not seem to remember that they have an existence upon the face of the earth.

Gentlemen, I fear that I shall become tedious. I leave this branch of the subject to take hold of another. I take up that part of Judge Douglas's speech in which he respectfully attended to me.

THE ISSUES OF THE CAMPAIGN

Judge Douglas made two points upon my recent speech at Springfield. He says they are to be the issues of this campaign. The first one of these points he bases upon the language in a speech which I delivered at Springfield, which I believe I can quote correctly from memory. I said there that "we are now far into the fifth year since a policy was instituted for the avowed object, and with the confident promise, of putting an end to slavery agitation; under the operation of that policy, that agitation has not only not ceased, but has constantly augmented." "I believe it will not cease until a crisis shall have been reached and passed. 'A house divided against itself cannot stand.' I believe this government cannot endure permanently of half slave and half free." "I do not expect the Union to be dissolved"—I am quoting from my speech—"I do not expect the house to fall, but I do expect it will cease to be divided. It will become all one thing or all the other. Either the opponents of slavery will arrest the further spread of it and place it where the public mind shall rest in the belief that it is in the course of ultimate extinction, or its advocates will push it forward until it shall become alike lawful in all the states, old as well as new, North as well as South."

That is the paragraph. In this paragraph, which I have quoted in your hearing, and to which I ask the attention of all, Judge Douglas thinks he discovers great political heresy. I want your attention particularly to what he has inferred from it. He says I am in favor of making all the states of this Union uniform in all their internal regulations; that in all their domestic concerns I am in favor of making them entirely uniform. He draws this inference from the language I have quoted to you. He says that I am in favor of making war by the North upon the South for the extinction of slavery; that I am also in favor of

inviting (as he expreses it) the South to a war upon the North for the purpose of nationalizing slavery. Now, it is singular enough, if you will carefully read that passage over, that I did not say that I was in favor of anything in it. I only said what I expected would take place. I made a prediction only—it may have been a foolish one, perhaps. I did not even say that I desired that slavery should be put in course of ultimate extinction. I do say so now, however, so there need be no longer any difficulty about that. It may be written down in the great speech.

Gentlemen, Judge Douglas informed you that this speech of mine was probably carefully prepared. I admit that it was. I am not master of language; I have not a fine education; I am not capable of entering into a disquisition upon dialectics, as I believe you call it; but I do not believe that the language I employed bears any such construction as Judge Douglas puts upon it. But I don't care about a quibble in regard to words. I know what I meant, and I will not leave this crowd in doubt, if I can explain it to them, what I really meant in the use of that paragraph.

I am not, in the first place, unaware that this government has endured eighty-two years half slave and half free. I know that. I am tolerably well acquainted with the history of the country, and I know that it has endured eighty-two years half slave and half free. I believe —and that is what I meant to allude to there—I believe it has endured, because during all that time, until the introduction of the Nebraska bill, the public mind did rest all the time in the belief that slavery was in course of ultimate extinction. That was what gave us the rest that we had through that period of eighty-two years—at least, so I believe. I have always hated slavery, I think, as much as any Abolitionist—I have been an Old Line Whig—I have always hated it; but I have always been quiet about it until this new era of the introduction of the Nebraska bill began. I always believed that everybody was against it, and that it was in course of ultimate extinction. [Pointing to Mr. Browning, who stood near by.] Browning thought so; the great mass of the nation have rested in the belief that slavery was in course of ultimate extinction. They had reason so to believe.

The adoption of the Constitution and its attendant history led the people to believe so; and that such was the belief of the framers of the Constitution itself. Why did those old men, about the time of the adoption of the Constitution, decree that slavery should not go into the new

territory, where it had not already gone? Why declare that within twenty years the African slave trade, by which slaves are supplied, might be cut off by Congress? Why were all these acts? I might enumerate more of these acts; but enough. What were they but a clear indication that the framers of the Constitution intended and expected the ultimate extinction of that institution? And now, when I say, as I said in my speech, that Judge Douglas has quoted from—when I say that I think the opponents of slavery will resist the farther spread of it, and place it where the public mind shall rest in the belief that it is in course of ultimate extinction, I only mean to say that they will place it where the founders of this government originally placed it.

THE RIGHT OF SELF-GOVERNMENT

I have said a hundred times, and I have now no inclination to take it back, that I believe there is no right, and ought to be no inclination, in the people of the free states to enter into the slave states and interfere with the question of slavery at all. I have said that always; Judge Douglas has heard me say it, if not quite a hundred times, at least as good as a hundred times; and when it is said that I am in favor of interfering with slavery where it exists, I know it is unwarranted by anything I have ever intended, and, as I believe, by anything I have ever said. If, by any means, I have ever used language which could fairly be so construed (as, however, I believe I never have), I now correct it.

So much, then, for the inference that Judge Douglas draws, that I am in favor of setting the sections at war with one another. I know that I never meant any such thing, and I believe that no fair mind can infer any such thing from anything I have ever said.

Now, in relation to his inference that I am in favor of a general consolidation of all the local institutions of the various states. I will attend to that for a little while, and try to inquire, if I can, how on earth it could be that any man could draw such an inference from anything I said. I have said, very many times, in Judge Douglas's hearing, that no man believed more than I in the principle of self-government; that it lies at the bottom of all my ideas of just government, from beginning to end. I have denied that his use of that term applies properly. But for the thing itself, I deny that any man has ever gone ahead of me in his devotion to the principle, whatever he may have done in efficiency in advocating it. I think that I have said it in your hearing, that I believe each individual is naturally entitled to do as he pleases with

himself and the fruit of his labor, so far as it in no wise interferes with any other man's rights; that each community, as a state, has a right to do exactly as it pleases with all the concerns within that state that interfere with the right of no other state; and that the general government, upon principle, has no right to interfere with anything other than that general class of things that does concern the whole. I have said that at all times. I have said, as illustrations, that I do not believe in the right of Illinois to interfere with the cranberry laws of Indiana, the oyster laws of Virginia, or the liquor laws of Maine. I have said these things over and over again, and I repeat them here as my sentiments.

How is it, then, that Judge Douglas infers, because I hope to see slavery put where the public mind shall rest in the belief that it is in the course of ultimate extinction, that I am in favor of Illinois going over and interfering with the cranberry laws of Indiana? What can authorize him to draw any such inference? I suppose there might be one thing that at least enabled him to draw such an inference that would not be true with me or many others, that is, because he looks upon all this matter of slavery as an exceedingly little thing—this matter of keeping one-sixth of the population of the whole nation in a state of oppression any tyranny unequaled in the world. He looks upon it as being an exceedingly little thing—only equal to the question of the cranberry laws of Indiana; as something having no moral question in it; as something on a par with the question of whether a man shall pasture his land with cattle, or plant it with tobacco; so little and so small a thing that he concludes, if I could desire that if anything should be done to bring about the ultimate extinction of that little thing, I must be in favor of bringing about an amalgamation of all the other little things in the Union.

Now, it so happens—and there, I presume, is the foundation of this mistake—that the Judge thinks thus; and it so happens that there is a vast portion of the American people that do not look upon that matter as being this very little thing. They look upon it as a vast moral evil; they can prove it as such by the writings of those who gave us the blessings of liberty which we enjoy, and that they so looked upon it, and not as an evil merely confining itself to the states where it is situated; and while we agree that, by the Constitution we assented to, in the states where it exists, we have no right to interfere with it, because it is in the Constitution; and we are by both duty and inclination to stick by that Constitution, in all its letter and spirit, from beginning to end.

So much, then, as to my disposition—my wish—to have all the state legislatures blotted out, and to have one consolidated government, and a uniformity of domestic regulations in all the States—by which I suppose it is meant, if we raise corn here, we must make sugar-cane grow here too; and we must make those things which grow North grow in the South. All this I suppose he understands I am in favor of doing. Now, so much for all this nonsense; for I must call it so. The Judge can have no issue with me on a question of establishing uniformity in the domestic regulations of the states.

THE DRED SCOTT DECISION

A little now on the other point—the Dred Scott decision. Another of the issues he says that is to be made with me is upon his devotion to the Dred Scott decision, and my opposition to it.

I have expressed heretofore, and I now repeat, my opposition to the Dred Scott decision; but I should be allowed to state the nature of that opposition, and I ask your indulgence while I do so. What is fairly implied by the term Judge Douglas has used, "resistance to the decision?" I do not resist it. If I wanted to take Dred Scott from his master, I would be interfering with property, and that terrible difficulty that Judge Douglas speaks of, of interfering with property, would arise. But I am doing no such thing as that, but all that I am doing is refusing to obey it as a political rule. If I were in Congress, and a vote should come up on a question whether slavery should be prohibited in a new territory, in spite of the Dred Scott decision, I would vote that it should.

That is what I should do. Judge Douglas said last night that before the decision he might advance his opinion, and it might be contrary to the decision when it was made; but after it was made he would abide by it until it was reversed. Just so! We let this property abide by the decision, but we will try to reverse that decision. [Applause.] We will try to put it where Judge Douglas would not object, for he says he will obey it until it is reversed. Somebody has to reverse that decision, since it is made, and we mean to reverse it, and we mean to do it peaceably.

What are the uses of decisions of courts? They have two uses. As rules of property they have two uses. First, they decide upon the question before the court. They decide in this case that Dred Scott is a slave. Nobody resists that. Not only that, but they say to everbody else, that a person standing just as Dred Scott stands, is as he is. That is, they say that when a question comes up upon another person, it will

be so decided again, unless the court decides in another way, unless the court overrules its decision. Well, we mean to do what we can to have the court decide the other way. [Renewed applause.] That is one thing we mean to try to do.

The sacredness that Judge Douglas throws around this decision is a degree of sacredness that has never been before thrown around any other decision. I have never heard of such a thing. Why, decisions apparently contrary to that decision, or that good lawyers thought were contrary to that decision, have been made by that very court before. It is the first of its kind; it is an astonisher in legal history. It is a new wonder of the world. It is based upon falsehood in the main as to the facts; allegations of facts upon which it stands are not facts at all in many instances, and no decision made upon any question—the first instance of a decision made under so many unfavorable circumstances—thus placed, has ever been held by the profession as law, and it has always needed confirmation before the lawyers regarded it as settled law. But Judge Douglas will have it that all hands must take this extraordinary decision, made under these extraordinary circumstances, and give their vote in Congress in accordance with it, yield to it, and obey it in every possible case. Circumstances alter cases. Do not gentlemen here remember the case of that same Supreme Court, some twenty-five or thirty years ago deciding that a national bank was constitutional? I ask if somebody does not remember that a national bank was declared to be constitutional? Such is the truth, whether it be remembered or not. The bank charter ran out, and a re-charter was granted by Congress. That re-charter was laid before General Jackson. It was urged upon him, when he denied the constitutionality of the bank, that the Supreme Court had decided that it was constitutional; and that General Jackson then said that the Supreme Court had no right to lay down a rule to govern a co-ordinate branch of the government, the members of which had sworn to support the Constitution; that each member had sworn to support the Constitution as he understood it. I will here venture to say that I have heard Judge Douglas say that he approved of General Jackson for that act. What has now become of all his tirade about "resistance to the Supreme Court?"

My fellow-citizens, getting back a little—for I pass from these points—when Judge Douglas makes his threat of annihilation upon the "alliance," he is cautious to say that that warfare of his is to fall upon the leaders of the Republican party. Almost every word he utters and

every distinction he makes, has its significance. He means for the Republicans who do not count themselves as leaders, to be his friends; he makes no fuss over them; it is the leaders that he is making war upon. He wants it understood that the mass of the Republican party are really his friends. It is only the leaders that are doing something, that are intolerant, and that require extermination at his hands. As this is clearly and unquestionably the light in which he presents that matter, I want to ask your attention, addressing myself to the Republicans here, that I may ask you some questions as to where you, as the Republican party, would be placed if you sustained Judge Douglas in his present position by a re-election?

I do not claim, gentlemen to be unselfish; I do not pretend that I would not like to go to the United States Senate—I make no such hypocritical pretense; but I do say to you that in this mighty issue it is nothing to you—nothing to the mass of the people of the nation—whether or not Judge Douglas or myself shall ever be heard of after this night; it may be a trifle to either of us, but in connection with this mighty question, upon which hang the destinies of the nation, perhaps, it is absolutely nothing: but where will you be placed if you re-indorse Judge Douglas? Don't you know how apt he is, how exceedingly anxoius he is at all times, to seize upon anything and everything to persuade you that something he has done you did yourselves? Why, he tried to persuade you last night that our Illinois legislature instructed him to introduce the Nebraska bill. There was nobody in the legislature ever thought of such a thing; and when he first introduced the bill, he never thought of it; but still he fights furiously for the proposition, and that he did it because there was a standing instruction to our Senators to be always introducing Nebraska bills.

He tells you he is for the Cincinnati platform; he tells you he is for the Dred Scott decision. He tells you, not in his speech last night, but substantially in a former speech, that he cares not if slavery is voted up or down; he tells you the struggle on Lecompton is past; it may come up again or not, and if it does, he stands where he stood when, in spite of him and his opposition, you built up the Republican party. If you indorse him, you tell him you do not care whether slavery be voted up or down, and he will close, or try to close your mouths with his declaration, repeated by the day, the week, the month, and the year. Is that what you mean? [Cries of "No;" one voice "Yes."] Yes, I have no doubt you who have always been for him—you mean that. No doubt of that,

soberly I have said, and I repeat it. I think, in the position in which Judge Douglas stood in opposing the Lecompton Constitution, he was right; he does not know that it will return, but if it does we may know where to find him, and if it does not, we may know where to look for him, and that is on the Cincinnati platform.

Now, I could ask the Republican party, after all the hard names that Judge Douglas has called them by—all his repeated charges of their inclination to marry with and hug negroes; all his declarations of Black Republicanism; by the way, we are improving, the black has got rubbed off—but with all that, if he be indorsed by Republican votes, where do you stand? Plainly, you stand ready saddled, bridled, and harnessed, and waiting to be driven over to the slavery extension camp of the nation—just ready to be driven over, tied together in a lot, to be driven over, every man with a rope around his neck, that halter being held by Judge Douglas. That is the question. If Republican men have been in earnest in what they have done, I think they had better not do it; but I think the Republican party is made up of those who, as far as they can peaceably, will oppose the extension of slavery; and who will hope for its ultimate extinction. If they believe it is wrong in grasping up the new lands of the continent, and keeping them from the settlement of free white laborers, who want the land to bring up their families upon; if they are in earnest, although they may make a mistake, they will grow restless, and the time will come when they will come back again and reorganize, if not by the same name, at least upon the same principles as their party now has. It is better, then, to save the work while it is begun. You have done the labor; maintain it, keep it. If men choose to serve you, go with them; but as you have made up your organization upon principle, stand by it; for, as surely as God reigns over you, and has inspired your mind, and given you a sense of propriety, and continues to give you hope, so surely will you still cling to these ideas, and you will at last come back again after your wanderings, merely to do your work over again.

THE DECLARATION OF INDEPENDENCE

We were often—more than once, at least—in the course of Judge Douglas's speech last night, reminded that this government was made for white men; that he believed it was made for white men. Well, that is putting it into a shape in which no one wants to deny it; but the Judge then goes into his passion for drawing inferences that are not warranted.

I protest now and forever, against that counterfeit logic which presumes that because I do not want a negro woman for a slave, I do necessarily want her for a wife. My understanding is that I need not have her for either, but, as God made us separate, we can leave one another alone, and do one another much good thereby. There are white men enough to marry all the white women, and enough black men to marry all the black women; and in God's name let them be so married. The Judge regales us with the terrible enormities that take place by the mixture of the races; that the inferior race bears the superior down. Why, Judge, if we do not let them get together in the territories, they won't mix there.

A Voice.—"Three cheers for Lincoln." (The cheers were given with a hearty good will.)

Mr. Lincoln.—I should say at least that that is a self-evident truth.

Now, it happens that we meet together once every year, some time about the Fourth of July, for some reason or other. These Fourth of July gatherings I suppose have their uses. If you will indulge me, I will state what I suppose to be some of them.

We are now a mighty nation; we are thirty, or about thirty millions of people, and we own and inhabit about one-fifteenth part of the dry land of the whole earth. We run our memory back over the pages of history for about eighty-two years, and we discover that we were then a very small people in point of numbers, vastly inferior to what we are now, with a vastly less extent of country, with vastly less of everything we deem desirable among men; we look upon the change as exceedingly advantageous to us and to our posterity, and we fix upon something that happened away back, as in some way or other being connected with this rise of prosperity. We find a race of men living in that day whom we claim as our fathers and grandfathers; they were iron men; they fought for the principle that they were contending for; and we understood that by what they then did it has followed that the degree of prosperity which we now enjoy has come to us. We hold this annual celebration to remind ourselves of all the good done in this process of time, of how it was done and who did it, and how we are historically connected with it; and we go from these meetings in better humor with ourselves, we feel more attached the one to the other, and more firmly bound to the country we inhabit. In every way we are better men in the age and race and country in which we live, for these celebrations.

But after we have done all this we have not yet reached the whole.

There is something else connected with it. We have—besides these men descended by blood from our ancestors—among us, perhaps half our people who are not descendants at all of these men; they are men who have come from Europe—German, Irish, French, and Scandinavian—men that have come from Europe themselves, or whose ancestors have come hither and settled here, finding themselves our equals in all things. If they look back through this history to trace their connection with those days by blood, they find they have none, they cannot carry themselves back into that glorious epoch and make themselves feel that they are part of us; but when they look through that old Declaration of Independence, they find that those old men say that "We hold these truths to be self-evident, that all men are created equal;" and then they feel that that moral sentiment, taught in that day, evidences their relation to those men, that it is the father of all moral principle in them and that they have a right to claim it as though they were blood of the blood, and flesh of the flesh, of the men who wrote that Declaration [Loud and long-continued applause]; and so they are. That is the electric cord in that Declaration that links the hearts of patriotic and liberty-loving men together; that will link those patriotic hearts as long as the love of freedom exists in the minds of men throughout the world. [Applause.]

Now, sirs, for the purpose of squaring things with this idea of "don't care if slavery is voted up or voted down," for sustaining the Dred Scott decision, for holding that the Declaration of Independence did not mean anything at all, we have Judge Douglas giving his exposition of what the Declaration of Independence means, and we have him saying that the people of America are equal to the people of England. According to his construction, you Germans are not connected with it. Now, I ask you in all soberness, if all these things, if indulged in, if ratified, if confirmed, and indorsed, if taught to our children and repeated to them, do not tend to rub out the sentiment of liberty in the country, and to transform this government into a government of some other form?

Those arguments that are made, that the inferior race are to be treated with as much allowance as they are capable of enjoying; that as much is to be done for them as their condition will allow. What are these arguments? They are the arguments that kings have made for enslaving the people in all ages of the world. You will find that all the arguments in favor of kingcraft were of this class; they always bestrode the necks of the people, not that they wanted to do it, but because their

people were better off for being ridden. That is their argument, and this argument of the Judge is the same old serpent that says, You work, and I eat; You toil, and I will enjoy the fruits of it. Turn it in whatever way you will, whether it come from the mouth of a king as an excuse for enslaving the people of his country, or from the mouths of men of one race as a reason for enslaving the men of another race, it is all the same old serpent; and I hold if that course of argumentation that is made for the purpose of convincing the public mind that we should not care about this, should be granted, it does not stop with the negro. I should like to know if, taking this old Declaration of Independence, which declares that all men are equal upon principle, and making exceptions to it, where will it stop? If one man says it does not mean a negro, why not another say it does not mean some other man? If that declaration is not the truth, let us get the statute book in which we find it and tear it out! Who is so bold as to do it? If it is not true, let us tear it out! [Cries of "No, no."] Let us stick to it, then; let us stand firmly by it, then.

It may be argued that there are certain conditions that make necessities and impose them upon us; and to the extent that a necessity is imposed upon a man, he must submit to it. I think that was the condition in which we found ourselves when we established this government. We had slaves among us, we could not get our Constitution unless we permitted them to remain in slavery, we could not secure the good we did secure if we grasped for more; but having by necessity submitted to that much, it does not destroy the principle that is the charter of our liberties. Let that charter stand as our standard.

My friend has said to me that I am a poor hand to quote scripture. I will try it again, however. It is said in one of the admonitions of our Lord, "As your Father in heaven is perfect, be ye also perfect." The Savior, I suppose, did not expect that any human creature could be perfect as the Father in heaven; but he said, "As your Father in heaven is perfect, be ye also perfect." He set that up as a standard; and he who did most toward reaching that standard, attained the highest degree of moral perfection. So I say in relation to the principle that all men are created equal, let it be as nearly reached as we can. If we cannot give freedom to every creature, let us do nothing that will impose slavery upon any other creature. Let us then turn this government back into the channel in which the framers of the Constitution originally placed it. Let us stand firmly by each other. If we do not do so, we are turn-

ing in the contrary direction, that our friend Judge Douglas proposes—not intentionally—as working in the traces that tend to make this one universal slave nation. He is one that runs in that direction, and as such I resist him.

My friends, I have detained you about as long as I desired to do, and I have only to say, Let us discard all this quibbling about this man and the other man; this race and that race and the other race being inferior, and therefore they must be placed in an inferior position; discarding our standard that we have left us—let us discard all these things, and unite as one people throughout this land, until we shall once more stand up declaring that all men are created equal.

My friends, I could not, without launching off upon some new topic, which would detain you too long, continue to-night. I thank you for this most extensive audience that you have furnished me to-night. I leave you, hoping that the lamp of liberty will burn in your bosoms until there shall no longer be a doubt that all men are created free and equal.

JEFFERSON DAVIS

Jefferson Davis was born in Christian County, Kentucky, June 3, 1808. He was educated at West Point and served in the army from 1828 to 1835, when he resigned to become a planter in Mississippi. In 1845 he was elected a Representative, but left the House to serve in the Mexican War. In 1848 he was chosen Senator. In 1857 he resigned to contest for the governorship of his state on the Democratic ticket, but was defeated. He was Secretary of War under Pierce, and introduced several improvements. In 1857 he was again elected to the Senate and became Buchanan's lieutenant and the leader in Congress of the extreme state-rights element. He was no friend of Douglas and in 1860 introduced his famous "Senate Resolutions" declaring that a territory (as well as Congress) had no right to keep out slavery, and demanding the protection of Congress for slavery in the territories. This denial of the right of the people in a territory to keep out slavery as opposed to

Douglas's "popular sovereignty" split the Democratic party. It made further compromise unobtainable and the war almost a certainty.

Davis resigned from the Senate on the secession of Mississippi in January, 1861, and was made provisional President of the Confederacy. He was confirmed in the Presidency in November, 1861. His administration of his office is a part of the history of the war. He died Dec. 6, 1889.

THAT THE TERRITORIES CANNOT KEEP OUT SLAVERY

1. Resolved, That in the adoption of the Federal Constitution, the states adopting the same acted severally as free and independent sovereignties, delegating a portion of their powers to be exercised by the Federal Government for the increased security of each against dangers, domestic as well as foreign; and that any intermeddling by any one or more states, or by a combination of their citizens, with the domestic institutions of the others, on any pretext whatever, political, moral or religious, with a view to their disturbance or subversion, is in violation of the Constitution, insulting to the states so interfered with, endangers their domestic peace and tranquility—objects for which the Constitution was formed—and by necessary consequence, tends to weaken and destroy the Union itself.

2. Resolved, That negro slavery, as it exists in fifteen states of this Union, composes an important portion of their domestic institutions, inherited from their ancestors, and existing at the adoption of the Constitution, by which it is recognized as constituting an important element in the apportionment of powers among the states; and that no change of opinion or feeling on the part of the non-slaveholding states of the Union, in relation to this institution, can justify them, or their citizens, in open or covert attacks thereon, with a view to its overthrow; and that all such attacks are in manifest violation of the mutual and solemn pledge to protect and defend each other, given by the states respectively on entering into the constitutional compact which formed the Union, and are a manifest breach of faith, and a violation of the most solemn obligations.

3. Resolved, That the Union of these states rests on the equality of rights and privileges among its members; and that it is especially the duty of the Senate, which represents the states in their sovereign

capacity, to resist all attempts to discriminate either in relation to persons or property in the territories, which are the common possessions of the United States, so as to give advantages to the citizens of one state which are not equally assured to those of every other state.

4. Resolved, That neither Congress nor a territorial legislature, whether by direct legislation or legislation of an indirect and unfriendly character, possess power to annul or impair the constitutional right of any citizen of the United States to take his slave property into the common territories, and there hold and enjoy the same while the territorial condition remains.

5. Resolved, That if experience should at any time prove that the judicial and executive authority do not possess means to insure adequate protection to constitutional rights in a territory, and if the territorial government should fail or refuse to provide the necessary remedies for that purpose, it will be the duty of Congress to supply such deficiency.

6. Resolved, That the inhabitants of a territory of the United States, when they rightfully form a constitution to be admitted as a state into the Union, may then, for the first time, like the people of a state when forming a new constitution, decide for themselves whether slavery, as a domestic institution, shall be maintained or prohibited within their jurisdiction; and "they shall be received into the Union with or without slavery, as their Constitution may prescribe at the time of their admission."

7. Resolved, That the provision of the Constitution for the rendition of fugitives from service or labor, without the adoption of which the Union could not have been formed, and that the laws of 1793 and 1850, which were enacted to secure its execution, and the main features of which, being similar, bear the impress of nearly seventy years of sanction by the highest judicial authority, should be honestly and faithfully observed and maintained by all who enjoy the benefits of our compact of Union; and that all acts of individuals or of state legislatures to defeat the purpose or nullify the requirements of that provision, and the laws made in pursuance of it, are hostile in character, subversive of the Constitution, and revolutionary in their effect.

THE PLATFORMS OF 1860

THE DEMOCRATIC convention met first at Charleston, S. C., April 23, 1860. The Committee on Resolutions was under control of the Southern Democrats, but the majority in the convention were Douglas men. The committee presented a report embodying Davis's idea of the inability of the territories to keep out slavery, but the convention voted it down and adopted a minority report sticking to Douglas's popular sovereignty principle, subject to a decision of the Supreme Court as to the power of a territory.

Hereupon in the midst of a stormy debate forty-five of the Southern members withdrew from the convention. The feeling on the spot is well shown in the following impassioned address of Mr. Glenn of Mississippi at the time of the withdrawal of the delegates of that State:

Mr. Glenn of Mississippi.—Mr. President and Gentlemen of this Convention: For the first time, for the only time, for the last time, in the name of the state that I have the honor in part to represent here, I desire to say but a few words to this convention. I hold in my hand the solemn act of her delegation upon this floor, and I say to you, gentlemen, that it is not a hasty action; that it is not one conceived in passion, or carried out in caprice or disappointment. It is the firm resolve of the great body of the people whom we represent, which was expressed in the convention which sent us here, and that resolve, that people, and we, their representatives, will maintain at all cost and at all hazards. (Loud cheers.)

We came here not to dictate to the representatives of other sovereign states. Since we have been here, our intercourse has been courteous as far as personalities are concerned. We have all sought, and I believe have all been able, to conduct ourselves as gentlemen. But we did not come here to exercise the courtesies of life alone. We came to settle the principles upon which our party must rest and must stand. We came here, gentlemen of the North, not to ask you to adopt a principle which you could say was opposed to your consciences and to your principles. We did not believe it to be so. We came as equal members of a common confederacy, simply to ask you to acknowledge our equal rights within that confederacy. (Cheers.) Sir, at Cincinnati we adopted a platform on which we all agreed. Now answer me, ye men of the North, of the East, of the South, and of the West, what was the

construction placed upon that platform in different sections of the Union? You at the West said it meant one thing, we of the South said it meant another. Either we were right or you were right; we were wrong or you were wrong. We came here to ask you which was right and which was wrong. You have maintained your position. You say that you cannot give us an acknowledgment of that right, which I tell you here now, in coming time will be your only safety in your contests with the Black Republicans of Ohio and of the North. (Cheers.)

Why, sir, turn back to the history of your own leading men. There sits a distinguished gentleman (Hon. Charles E. Stuart of Michigan), once a representative of one of the sovereign states of the Union in the Senate, who then voted that Congress had the constitutional power to pass the Wilmot Proviso, and to exclude slavery from the territories; and now, when the Supreme Court has said that it has not that power, he comes forward and tells Mississippians that that same Congress is impotent to protect that same species of property. There sits my distinguished friend, the Senator from Ohio (Mr. Pugh), who but a few nights since told us from that stand that if a territorial government totally misused their powers or abused them, Congress could wipe out that territorial government altogether. And yet, when we come here and ask him to give us protection in case that territorial government robs us of our property and strikes the star which answers to the name of Mississippi from the flag of the Union, so far as the Constitution gives her protection, he tells us, with his hand upon his heart—as Governor Payne of Ohio had before done—that they will part with their lives before they will acknowledge the principle which we contend for.

Gentlemen, in such a situation of things in the convention of our great party it is right that we should part. Go your way, and we will go ours. The South leaves you—not like Hagar, driven into the wilderness, friendless and alone—but I tell Southern men here, and for them, I tell the North, that in less than sixty days you will find a united South standing side by side with us. (Prolonged and enthusiastic cheering.)

We stand firm and immovable, and while we respect you, we must respect ourselves. And, gentlemen, let me say to you of the North now, that the time may come when you will need us more than we need you. I speak to those who represent "the green hills of New England;" I speak to the "imperial center" of the Union. There slumbers in your midst a latent spark—not of political sectionalism, but of social discord—which may yet require the conservative principles of the South to save your region of country from anarchy and confusion. We need not your protection. The power of the Black Republicans is nothing to us. We are safe in our own strength and security, so long as we maintain our rights.

Gentlemen, I have detained you too long. I ask, in conclusion, that the few words which are here written—words of courtesy, but words of truth so far as my glorious state is concerned—may be read in your hearing.

Senator Douglas led in the vote for a presidential candidate, but he did not receive a two-thirds majority of the full convention, and in

the hopes of effecting some compromise the convention was adjourned to meet again in Baltimore, June 18. Here practically the same program was enacted. The majority nominated Douglas on the "popular sovereignty" platform. The seceders nominated John C. Breckinridge of Kentucky on the platform originally submitted as the majority report by the Committee on Resolutions at Charleston.

In the meantime the remnants of the Whig and American parties met in convention at Baltimore, May 9, and adopted a platform lauding the Constitution and the Union, leaving the question of slavery untouched upon. This Constitutional Union party nominated Bell of Tennessee and Everett of Massachusetts.

The Republican convention met May 18. The platform lauded the phrase "all men are created equal" of the Declaration of Independence, decried all attempts at disunion either from Abolitionists or Southerners, supported the rights of each State in internal affairs (slavery), denied the justness of the Dred Scott Decision, and the right of slavery to exist in a territory, favored a protective policy and internal improvement

The leading candidate at first was Seward, but Seward was radical, the logical opponent of the Southern Democrats, and the Republican party could not expect to make any fight in the South. The party was going to have to meet Douglas in the North, and the man that stood the best chance of doing that was Lincoln. Illinois had gone Democratic the previous election—Lincoln might turn the scale in that State. Lincoln was nominated and Pennsylvania, which had also gone Democratic in 1856, was promised protection to manufactures. When the convention closed its work, there was but little doubt which way the election would go, and in the South measures looking toward secession had already begun.

DOUGLAS DEMOCRATIC PLATFORM

1. Resolved, That we, the Democracy of the Union, in convention assembled, hereby declare our affirmance of the resolutions unanimously adopted and declared as a platform of principles by the Democratic convention at Cincinnati in the year 1856, believing that Democratic principles are unchangeable in their nature when applied to the same

subject-matters; and we recommend as the only further resolutions the following:—

Inasmuch as differences of opinion exist in the Democratic party as to the nature and extent of the powers of a territorial legislature, and as to the powers and duties of Congress, under the Constitution of the United States, over the institution of slavery within the territories,—

2. Resolved, That the Democratic party will abide by the decisions of the Supreme Court of the United States on the questions of constitutional law.

3. Resolved, That it is the duty of the United States to afford ample and complete protection to all its citizens, whether at home or abroad, and whether native or foreign.

4. Resolved, That one of the necessities of the age, in a military, commercial, and postal point of view, is speedy communication between the Atlantic and Pacific states; and the Democratic party pledge such constitutional government aid as will insure the construction of a railroad to the Pacific coast at the earliest practicable period.

5. Resolved, That the Democratic party are in favor of the acquisition of the island of Cuba, on such terms as shall be honorable to ourselves and just to Spain.

6. Resolved, That the enactments of state legislatures to defeat the faithful execution of the fugitive slave law are hostile in character, subversive of the Constitution, and revolutionary in their effects.

Resolved, That it is in accordance with the interpretation of the Cincinnati platform that, during the existence of the territorial governments, the measure of restriction, whatever it may be, imposed by the Federal Constitution on the power of the territorial legislature over the subject of the domestic relations, as the same has been, or shall hereafter be, finally determined by the Supreme Court of the United States, should be respected by all good citizens, and enforced with promptness and fidelity by every branch of the general government.

SOUTHERN DEMOCRATIC PLATFORM

Resolved, That the platform adopted by the Democratic party at Cincinnati be affirmed, with the following explanatory resolutions:—

1. That the government of a territory organized by an act of Con-

gress is provisional and temporary; and, during its existence, all citizens of the United States have an equal right to settle with their property in the territory, without their rights, either of person or of property, being destroyed or impaired by Congressional legislation.

2. That it is the duty of the Federal government, in all its departments, to protect, when necessary, the rights of persons and property in the territories, and wherever else its constitutional authority extends.

3. That when the settlers in a territory, having an adequate population, form a state constitution, the right of sovereignty commences, and being consummated by admission into the Union, they stand on an equal footing with the people of other states; and the state thus organized ought to be admitted into the Federal Union, whether its constitution prohibits or recognizes the institution of slavery.

4. That the Democratic party are in favor of the acquisition of the island of Cuba, on such terms as shall be honorable to ourselves and just to Spain, at the earliest practicable moment.

5. That the enactments of state legislatures to defeat the faithful execution of the fugitive slave law are hostile in character, subversive of the Constitution, and revolutionary in their effect.

6. That the Democracy of the United States recognize it as the imperative duty of this government to protect the naturalized citizen in all his rights, whether at home or in foreign lands, to the same extent as its native-born citizens.

Whereas, One of the greatest necessities of the age, in a political, commercial, postal, and military point of view, is a speedy communication between the Pacific and Atlantic coasts,—

Therefore be it Resolved, That the Democratic party do hereby pledge themselves to use every means in their power to secure the passage of some bill, to the extent of the constitutional authority of Congress, for the construction of a Pacific railroad from the Mississippi River to the Pacific Ocean, at the earliest practicable moment.

REPUBLICAN PLATFORM

Resolved, That we, the delegated representatives of the Republican electors of the United States, in convention assembled, in discharge of

the duty we owe to our constituents and our country, unite in the following declarations:—

1. That the history of the nation, during the last four years, has fully established the propriety and necessity of the organization and perpetuation of the Republican party, and that the causes which called it into existence are permanent in their nature, and now, more than ever before, demand its peaceful and constitutional triumph.

2. That the maintenance of the principles promulgated in the Declaration of Independence and embodied in the Federal Constitution,—"that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness; that, to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed,"—is essential to the preservation of our republican institutions; and that the Federal Constitution, the rights of the States, and the union of the States, must and shall be preserved.

3. That to the union of the States this nation owes its unprecedented increase in population, its surprising development of material resources, its rapid augmentation of wealth, its happiness at home, and its honor abroad; and we hold in abhorrence all schemes for disunion, come from whatever source they may; and we congratulate the country that no Republican member of Congress has uttered or countenanced the threats of disunion so often made by Democratic members, without rebuke and with applause from their political associates; and we denounce those threats of disunion, in case of a popular overthrow of their ascendancy, as denying the vital principles of a free government, and as an avowal of contemplated treason, which it is the imperative duty of an indignant people sternly to rebuke and forever silence.

4. That the maintenance inviolate of the rights of the States, and especially the right of each State to order and control its own domestic institutions according to its own judgment exclusively, is essential to that balance of power on which the perfection and endurance of our political fabric depends; and we denounce the lawless invasion by armed force of the soil of any State or Territory, no matter under what pretext, as among the gravest of crimes.

5. That the present Democratic administration has far exceeded our worst apprehensions, in its measureless subserviency to the exactions of a sectional interest, as especially evinced in its desperate exertions to force the infamous Lecompton Constitution upon the protesting people

of Kansas; in construing the personal relation between master and servant to involve an unqualified property in person; in its attempted enforcement, everywhere, on land and sea, through the intervention of Congress and of the Federal courts, of the extreme pretensions of a purely local interest; and in its general and unvarying abuse of the power entrusted to it by a confiding people.

6. That the people justly view with alarm the reckless extravagance which pervades every department of the Federal Government; that a return to rigid economy and accountability is indispensable to arrest the systematic plunder of the public treasury by favored partisans; while the recent startling developments of frauds and corruptions at the Federal metropolis show that an entire change of administration is imperatively demanded.

7. That the new dogma that the Constitution, of its own force, carries slavery into any or all of the Territories of the United States, is a dangerous political heresy, at variance with the explicit provisions of that instrument itself, with contemporaneous exposition, and with legislative and judicial precedent; is revolutionary in its tendency, and subversive of the peace and harmony of the country.

8. That the normal condition of all the territory of the United States is that of freedom; that as our Republican fathers, when they had abolished slavery in all our national territory, ordained that no person should be deprived of life, liberty, or property without due process of law, it becomes our duty, by legislation, whenever such legislation is necessary, to maintain this provision of the Constitution against all attempts to violate it; and we deny the authority of Congress, of a territorial legislature, or of any individual, to give legal existence to slavery in any Territory of the United States.

9. That we brand the recent reopening of the African slave-trade, under the cover of our national flag, aided by perversions of judicial power, as a crime against humanity, and a burning shame to our country and age; and we call upon Congress to take prompt and efficient measures for the total and final suppression of that execrable traffic.

10. That in the recent vetoes, by their Federal governors, of the acts of the legislatures of Kansas and Nebraska, prohibiting slavery in those Territories, we find a practical illustration of the boasted Democratic principle of non-intervention and popular sovereignty, embodied in the Kansas-Nebraska Bill, and a demonstration of the deception and fraud involved therein.

11. That Kansas should of right be immediately admitted as a State under the Constitution recently formed and adopted by her people and accepted by the House of Representatives.

12. That, while providing revenue for the support of the general government by duties upon imports, sound policy requires such an adjustment of these imposts as to encourage the development of the industrial interests of the whole country; and we commend that policy of national exchanges which secures to the workingmen liberal wages, to agriculture remunerating prices, to mechanics and manufacturers an adequate reward for their skill, labor, and enterprise, and to the nation commercial prosperity and independence.

13. That we protest against any sale or alienation to others of the public lands held by actual settlers, and against any view of the free-homestead policy which regards the settlers as paupers or suppliants for public bounty; and we demand the passage by Congress of the complete and satisfactory homestead measures which has already passed the House.

14. That the Republican party is opposed to any change in our naturalization laws, or any State legislation by which the rights of citizenship hitherto accorded to immigrants from foreign lands shall be abridged or impaired; and in favor of giving a full and efficient protection to the rights of all classes of citizens, whether native or naturalized, both at home and abroad.

15. That appropriations by Congress for river and harbor improvements of a national character, required for the accommodation and security of our existing commerce, are authorized by the Constitution, and justified by the obligations of government to protect the lives and property of its citizens.

16. That a railroad to the Pacific Ocean is imperatively demanded by the interests of the whole country; that the Federal Government ought to render immediate and efficient aid in its construction; and that, as preliminary thereto, a daily overland mail should be promptly established.

17. Finally, having thus set forth our distinctive principles and views, we invite the co-operation of all citizens, however differing on other questions, who substantially agree with us in their affirmance and support.

THE CONSTITUTIONAL UNION PLATFORM

The Constitutional Union party held its first and only national convention May 9, 1860. The Southern members were mostly from the lingering remnants of the American or Know Nothing party; the Northern were representatives of the old Whigs. It is often lost sight of that this effort to avoid the question of slavery altogether was a logical sequence of the old Whig spirit. More than anything else the Whigs, represented best by Clay, subordinated everything to the Union and sought by everlasting compromise to keep the Union intact. But the question of slavery, since the entrance of the "squatter sovereignty" idea, had grown too vital, and the issue too sharply drawn, to be compromised or evaded.

When the war broke out the members of the Constitutional Union party in the North joined the Republican forces, and in the far South, at least, were carried with their states for secession.

PLATFORM

Whereas, Experience has demonstrated that platforms adopted by the partisan conventions of the country have had the effect to mislead and deceive the people, and at the same time to widen the political divisions of the country by the creation and encouragement of geographical and sectional parties, therefore—

Resolved, That it is both the part of patriotism and of duty to recognize no political principle other than the Constitution of the country, the union of the States, and the enforcement of the laws, and that, as representatives of the Constitutional Union men of the country in national convention assembled, we hereby pledge ourselves to maintain, protect, and defend, separately and unitedly, these great principles of public liberty and national safety, against all enemies at home and abroad, believing that thereby peace may once more be restored to the country, the rights of the people and of the States re-established, and the government again placed in that condition of justice, fraternity, and equality, which, under the example and Constitution of our fathers, has solemnly bound every citizen of the United States to maintain a more perfect union, establish justice, insure domestic tranquility, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity.

SECESSION
(Dec. 20, 1860)

AN ORDINANCE

To dissolve the Union between the State of South Carolina and other States united with her under the compact entitled "The Constitution of the United States of America."

We, the People of the State of South Carolina, in Convention assembled, do declare and ordain, and it is hereby declared and ordained.

That the Ordinance adopted by us in Convention, on the twenty-third day of May, in the year of our Lord one thousand seven hundred and eighty-eight, whereby the Constitution of the United States of America was ratified, and also, all Acts and parts of Acts of the General Assembly of this State, ratifying amendments of the said Constitution, are hereby appealed; and that the union now subsisting between South Carolina and other States, under the name of "The United States of America," is hereby dissolved.—*Pamphlet, printed by order of the Convention,* 1860, p. 11.

1860. Dec. 24. South Carolina's Declaration of Causes which induced her Secession from the Federal Union.

Declaration of the immediate causes which induce and justify the secession of South Carolina from the Federal Union.

The People of the State of South Carolina, in Convention assembled, on the 26th day of April, A. D., 1852, declared that the frequent violations of the Constitution of the United States, by the Federal Government, and its encroachments upon the reserved rights of the States, fully justified this State in then withdrawing from the Federal Union; but in deference to the opinions and wishes of the other slave-holding States, she forbore at that time to exercise this right. Since that time, these encroachments have continued to increase, and further forbearance ceases to be a virtue.

And now the State of South Carolina having resumed her separate and equal place among nations, deems it due to herself, to the remaining United States of America, and to the nations of the world, that she should declare the immediate causes which have led to this act.

In the year 1765, that portion of the British Empire embracing Great Britain, undertook to make laws for the government of that por-

tion composed of the thirteen American Colonies. A struggle for the right of self-government ensued, which resulted, on the 4th July, 1776, in a Declaration, by the Colonies, "that they are, and of right ought to be, FREE AND INDEPENDENT STATES; and that, as free and independent States, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent States may of right do."

They further solemnly declared that whenever any "form of government becomes destructive of the ends for which it was established, it is the right of the people to alter or abolish it, and to institute a new government." Deeming the Government of Great Britain to have become destructive of these ends, they declared that the Colonies "are absolved from all allegiance to the British Crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved."

In pursuance of this Declaration of Independence, each of the thirteen States proceeded to exercise its separate sovereignty; adopted for itself a Constitution, and appointed officers for the administration of government in all its departments—Legislative, Executive and Judicial. For purposes of defence, they united their arms and their counsels; and, in 1778, they entered into a League known as the Articles of Confederation, whereby they agreed to entrust the administration of their external relations to a common agent, known as the Congress of the United States, expressly declaring, in the first article, "that each State retains its sovereignty, freedom and independence, and every power, jurisdiction and right which is not, by this Confederation, expressly delegated to the United States in Congress assembled.

Under this Confederation the War of the Revolution was carried on, and on the 3d September, 1783, the contest ended, and a definitive Treaty was signed by Great Britain, in which she acknowledged the Independence of the Colonies in the following terms:

"*Article* 1.—His Britannic Majesty acknowledges the said United States, viz: New Hampshire, Massachusetts Bay, Rhode Island and Providence Plantations, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina and Georgia, to be FREE, SOVEREIGN AND INDEPENDENT STATES; that he treats with them as such; and for himself, his heirs and successors, relinquishes all claims to the government, propriety and territorial rights of the same and every part thereof."

Thus were established the two great principles asserted by the Colonies, namely: the right of a State to govern itself; and the right of a people to abolish a Government when it becomes destructive of the ends for which it was instituted. And concurrent with the establishment of these principles, was the fact, that each Colony became and was recognized by the mother Country as a FREE, SOVEREIGN AND INDEPENDENT STATE.

In 1787, Deputies were appointed by the States to revise the Articles of Confederation, and on 17th September, 1787, these Deputies recommended, for the adoption of the States, the Articles of Union, known as the Constitution of the United States.

The parties to whom this Constitution was submitted were the several sovereign States; they were to agree or disagree, and when nine of them agreed, the compact was to take effect among those concurring; and the General Government, as the common agent, was then to be invested with their authority.

If only nine of the thirteen States had concurred, the other four would have remained as they were—separate sovereign States, independent of any of the provisions of the Constitution. In fact, two of the States did not accede to the Constitution until long after it had gone into operation among the other eleven; and during that interval, they each exercised the functions of an independent nation.

By this Constitution, certain duties were imposed upon the several States, and the exercise of certain of their powers was restrained, which necessarily implied their continued existence as sovereign States. But, to remove all doubt an amendment was added, which declared that the powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States, respectively, or to the people. On 23d May, 1788, South Carolina, by a Convention of her people, passed an Ordinance assenting to this Constitution, and afterwards altered her own Constitution, to conform herself to the obligations she had undertaken.

Thus was established, by compact between the States, a Government, with defined objects and powers, limited to the express words of the grant. This limitation left the whole remaining mass of power subject to the clause reserving it to the States or to the people, and rendered unnecessary any specification of reserved rights.

We hold that the Government thus established is subject to the two great principles asserted in the Declaration of Independence; and

we hold further, that the mode of its formation subjects it to a third fundamental principle, namely: the law of compact. We maintain that in every compact between two or more parties, the obligation is mutual; that the failure of one of the contracting parties to perform a material part of the agreement, entirely releases the obligation of the other; and that where no arbiter is provided, each party is remitted to his own judgment to determine the fact of failure, with all its consequences.

In the present case, that fact is established with certainty. We assert, that fourteen of the States have deliberately refused for years past to fulfil their constitutional obligations, and we refer to their own Statutes for the proof.

The Constitution of the United States, in its 4th Article, provides as follows:

"No person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up, on claim of the party to whom such service or labor may be due."

This stipulation was so material to the compact, that without it that compact would not have been made. The greater number of the contracting parties held slaves, and they had previously evinced their estimate of the value of such a stipulation by making it a condition in the Ordinance for the government of the territory ceded by Virginia, which now composes the States north of the Ohio river.

The same article of the Constitution stipulates also for rendition by the several States of fugitives from justice from the other States.

The General Government, as the common agent, passed laws to carry into effect these stipulations of the States. For many years these laws were executed. But an increasing hostility on the part of the non-slaveholding States to the Institution of Slavery has led to a disregard of their obligations, and the laws of the General Government have ceased to effect the objects of the Constitution. The States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, Illinois, Indiana, Michigan, Wisconsin and Iowa, have enacted laws which either nullify the Acts of Congress or render useless any attempt to execute them. In many of these States the fugitive is discharged from the service or labor claimed, and in none of them has the State Government complied with the stipulation made in the

Constitution. The State of New Jersey, at an early day, passed a law in conformity with her constitutional obligation; but the current of anti-slavery feeling has led her more recently to enact laws which render inoperative the remedies provided by her own law and by the laws of Congress. In the State of New York even the right of transit for a slave has been denied by her tribunals; and the States of Ohio and Iowa have refused to surrender to justice fugitives charged with murder, and with inciting servile insurrection in the State of Virginia. Thus the constitutional compact has been deliberately broken and disregarded by the non-slaveholding States, and the consequence follows that South Carolina is released from her obligation.

The ends for which this Constitution was framed are declared by itself to be "to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity."

These ends it endeavored to accomplish by a Federal Government, in which each State was recognized as an equal, and had separate control over its own institutions. The right of property in slaves was recognized by giving to free persons distinct political rights, by giving them the right to represent, and burthening them with direct taxes for three-fifths of their slaves; by authorizing the importation of slaves for twenty years; and by stipulating for the rendition of fugitives from labor.

We affirm that these ends for which this Government was instituted have been defeated, and the Government itself has been made destructive of them by the action of the non-slaveholding States. Those States have assumed the right of deciding upon the propriety of our domestic Institutions; and have denied the rights of property established in fifteen of the States and recognized by the Constitution; they have denounced as sinful the institution of Slavery; they have permitted the open establishment among them of societies, whose avowed object is to disturb the peace and to eloign the property of the citizens of other States. They have encouraged and assisted thousands of our slaves to leave their homes; and those who remain, have been incited by emissaries, books and pictures to servile insurrection.

For twenty-five years this agitation has been steadily increasing, until it has now secured to its aid the power of the Common Government. Observing the forms of the Constitution, a sectional party has

found within that article establishing the Executive Department, the means of subverting the Constitution itself. A geographical line has been drawn across the Union, and all the States north of that line have united in the election of a man to the high office of President of the United States whose opinions and purposes are hostile to slavery. He is to be entrusted with the administration of the Common Government, because he has declared that that "Government cannot endure permanently half slave, half free," and that the public mind must rest in the belief that Slavery is in the course of ultimate extinction.

This sectional combination for the subversion of the Constitution, has been aided in some of the States by elevating to citizenship persons who, by the Supreme Law of the land, are incapable of becoming citizens; and their votes have been used to inaugurate a new policy, hostile to the South, and destructive of its peace and safety.

On the 4th March next, this party will take possession of the Government. It has announced that the South shall be excluded from the common Territory; that the Judicial Tribunals shall be made sectional, and that a war must be waged against slavery until it shall cease throughout the United States.

The Guaranties of the Constitution will then no longer exist; the equal rights of the States will be lost. The slave-holding States will no longer have the power of self-government, or self-protection, and the Federal Government will have become their enemy.

Sectional interest and animosity will deepen the irritation, and all hope of remedy is rendered vain, by the fact that public opinion at the North has invested a great political error with the sanctions of a more erroneous religious belief.

We, therefore, the people of South Carolina, by our delegates, in Convention assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, have solemnly declared that the Union heretofore existing between this State and the other States of North America, is dissolved, and that the State of South Carolina has resumed her position among the nations of the world, as a separate and independent State; with full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent States may of right do.—*Pamphlet, printed by order of the Convention,* 1860, pp. 3-10.

EVOLUTION

CHARLES LYELL

CHARLES LYELL was born at Kinnordy, Scotland, Nov. 14, 1797. His father was a botanist and of literary tastes. He was graduated from Oxford in 1821, and admitted to the bar in 1825. His tastes, however, lay toward science and in 1827 he abandoned the law for geology.

The first volume of his "Principles of Geology" was published in 1830, the third in 1833. The work has gone through many editions. Lyell's main thought is that all the the past changes of the earth can be explained by the forces now acting. This idea formed the basis of recent geology. It is hard to realize how strange it seemed at the time.

In 1863 in his "Antiquity of Man" he massed the proofs of man's long existence on the earth.

Lyell was always an evolutionist in geology in the wider sense, and was one of the first to accept Darwin's theory of natural selection in biology.

He died February 22, 1875.

UNIFORMITY IN THE SERIES OF PAST CHANGES IN THE ANIMATE AND INANIMATE WORLD

Origin of the doctrine of alternate periods of repose and disorder.— It has been truly observed that when we arrange the fossiliferous formations in chronological order, they constitute a broken and defective

series of monuments; we pass without any intermediate gradations from systems of strata which are horizontal, to other systems which are highly inclined—from rocks of peculiar mineral composition to others which have a character wholly distinct—from one assemblage of organic remains to another, in which frequently nearly all the species, and a large part of the genera, are different. These violations of continuity are so common as to constitute in most regions the rule rather than the exception, and they have been considered by many geologists as conclusive in favour of sudden revolutions in the inanimate and animate world. We have already seen that according to the speculations of some writers, there have been in the past history of the planet alternate periods of tranquility and convulsion, the former enduring for ages, and resembling the state of things now experienced by man; the other brief, transient, and paroxysmal, giving rise to new mountains, seas, and valleys, annihilating one set of organic beings, and ushering in the creation of another.

It will be the object of the present chapter to demonstrate that these theoretical views are not borne out by a fair interpretation of geological monuments. It is true that in the solid framework of the globe we have a chronological chain of natural records, many links of which are wanting: but a careful consideration of all the phenomena leads to the opinion that the series was originally defective—that it has been rendered still more so by time—that a great part of what remains is inaccessible to man, and even of that fraction which is accessible nine-tenths or more are to this day unexplored.

The readiest way, perhaps of persuading the reader that we may dispense with great and sudden revolutions in the geological order of events is by showing him how a regular and uninterrupted series of changes in the animate and inanimate world must give rise to such breaks in the sequence, and such unconformability of stratified rocks, as are usually thought to imply convulsions and catastrophes. It is scarcely necessary to state that the order of events thus assumed to occur, for the sake of illustration, should be in harmony with all the conclusions legitimately drawn by geologists from the structure of the earth, and must be equally in accordance with the changes observed by man to be now going on in the living as well as in the inorganic creation. It may be necessary in the present state of science to supply some part of the assumed course of nature hypothetically; but if so, this must be done without any violation of probability, and always consistently with the

analogy of what is known both of the past and present economy of our system. Although the discussion of so comprehensive a subject must carry the beginner far beyond his depth, it will also, it is hoped, stimulate his curiosity, and prepare him to read some elementary treatises on geology with advantage, and teach him the bearing on that science of the changes now in progress on the earth. At the same time it may enable him the better to understand the intimate connection between the Second and Third Books of this work, one of which is occupied with the changes of the inorganic, the latter with those of the organic creation.

In pursuance, then, of the plan above proposed, I will consider in this chapter, first, the laws which regulate the denudation of strata and the deposition of sediment; secondly, those which govern the fluctuation in the animate world; and thirdly, the mode in which subterranean movements affect the earth's crust.

Uniformity of change considered, first, in reference to denudation and sedimentary deposition.—First, in regard to the laws governing the deposition of new strata. If we survey the surface of the globe, we immediately perceive that it is divisible into areas of deposition and non-deposition; or, in other words, at any given time there are spaces which are the recipients, others which are not the recipients, of sedimentary matter. No new strata, for example, are thrown down on dry land, which remains the same from year to year; whereas, in many parts of the bottom of seas and lakes, mud, sand, and pebbles are annually spread out by rivers and currents. There are also great masses of limestone growing in some seas, chiefly composed of corals and shells, or, as in the depths of the Atlantic, of chalky mud made up of foraminifera and diatomaceæ.

As to the dry land, so far from being the receptacle of fresh accessions of matter, it is exposed almost everywhere to waste away. Forests may be as dense and lofty as those of Brazil, and may swarm with quadrupeds, birds, and insects, yet at the end of thousands of years one layer of black mould a few inches thick may be the sole representative of those myriads of trees, leaves, flowers, and fruits, those innumerable bones and skeletons of birds, quadrupeds, and reptiles, which tenanted the fertile region. Should this land be at length submerged, the waves of the sea may wash away in a few hours the scanty covering of mould, and it may merely impart a darker shade of colour to the next stratum of marl, sand, or other matter newly thrown down. So also at the bot-

tom of the ocean where no sediment is accumulating, seaweed, zoophytes, fish, and even shells, may multiply for ages and decompose, leaving no vestige of their form or substance behind. Their decay, in water, although more slow, is as certain and eventually as complete as in the open air. Nor can they be perpetuated for indefinite periods in a fossil state, unless imbedded in some matrix which is impervious to water, or which at least does not allow a free percolation of that fluid, impregnated as it usually is, with a slight quantity of carbonic or other acid. Such a free percolation may be prevented either by the mineral nature of the matrix itself, or by the superposition of an impermeable stratum; but if unimpeded, the fossil shell or bone will be dissolved and removed, particle after particle, and thus entirely effaced, unless petrifaction or the substitution of some mineral for the organic matter happen to take place.

That there has been land as well as sea at all former geological periods, we know from the fact that fossil trees and terrestrial plants are imbedded in rocks of every age, except those which are so ancient as to be very imperfectly known to us. Occasionally lacrustine and fluviatile shells, or the bones of amphibious or land reptiles, point to the same conclusion. The existence of dry land at all periods of the past implies, as before mentioned, the partial deposition of sediment, or its limitation to certain areas; and the next point to which I shall call the reader's attention is the shifting of these areas from one region to another.

First, then, variations in the site of sedimentary deposition are brought about independently of subterranean movements. There is always a slight change from year to year, or from century to century. The sediment of the Rhone, for example, thrown in the Lake of Geneva, is now conveyed to a spot a mile and a half distant from that where it accumulated in the tenth century, and six miles from the point where the delta began originally to form. We may look forward to the period when this lake will be filled up, and then the distribution of the transported matter will be suddenly altered, for the mud and sand brought down from the Alps will thenceforth, instead of being deposited near Geneva, be carried nearly 200 miles southwards, where the Rhone enters the Mediterranean.

In the deltas of large rivers, such as those of the Ganges and Indus, the mud is first carried down for many centuries through one arm, and on this being stopped up it is discharged by another, and may then enter

the sea at a point 50 or 100 miles distant from its first receptacle. The direction of marine currents is also liable to be changed by various accidents, as by the heaping up of new sandbanks, or the wearing away of cliffs and promontories.

But, secondly, all these causes of fluctuation in the sedimentary areas are entirely subordinate to those great upward or downward movements of lands, which will be presently spoken of, as prevailing over large tracts of the globe. By such elevation or subsidence certain spaces are gradually submerged, or made gradually to emerge: in the one case sedimentary deposition may be suddenly renewed after having been suspended for one or more geological periods, in the other as suddenly made to cease after having continued for ages.

If deposition be renewed after a long interval, the new strata will usually differ greatly from the sedimentary rocks previously formed in the same place, and especially if the older rocks have suffered derangement, which implies a change in the physical geography of the district since the previous conveyance of sediment to the same spot. It may happen, however, that, even where the two groups, the superior and the inferior, are horizontal and conformable to each other, they may still differ entirely in mineral character, because, since the origin of the older formation, the geography of some distant country has been altered. In that country rocks before concealed may have become exposed by denudation; volcanoes may have burst out and covered the surface with scoriæ and lava; or new lakes, intercepting the sediment previously conveyed from the upper country, may have been formed by subsidence; and other fluctuations may have occurred, by which the materials brought down from thence by rivers to the sea have acquired a distinct mineral character.

It is well known that the stream of the Mississippi is charged with sediment of a different colour from that of the Arkansas and Red Rivers, which are tinged with red mud, derived from rocks of porphyry and red gypseous clays in "the far west." The waters of the Uruguay, says Darwin, draining a granitic country, are clear and black, those of the Parana, red. The mud with which the Indus is loaded, says Burnes, is of a clayey hue, that of the Chenab, on the other hand, is reddish, that of the Sutlej is more pale. The same causes which make these several rivers, sometimes situated at no great distance the one from the other, to differ greatly in the character of their sediment, will make the waters draining the same country at different epochs, especially before and after

great revolutions in physical geography, to be entirely dissimilar. It is scarcely necessary to add that marine currents will be affected in an analogous manner in consequence of the formation of new shoals, the emergence of new islands, the subsidence of others, the gradual waste of neighbouring coasts, the growth of new deltas, the increase of coral reefs, volcanic eruptions, and other changes.

Uniformity of change considered, secondly, in reference to the living creation.—Secondly, in regard to the vicissitudes of the living creation, all are agreed that the successive groups of sedimentary strata found in the earth's crust are not only dissimilar in mineral composition for reasons above alluded to, but are likewise distinguishable from each other by their organic remains. The general inference drawn from the study and comparison of the various groups, arranged in chronological order, is this: that at successive periods distinct tribes of animals and plants have inhabited the land and waters, and that the organic types of the newer formations are more analogous to species now existing than those of more ancient rocks. If we then turn to the present state of the animate creation, and inquire whether it has now become fixed and stationary, we discover that, on the contrary, it is in a state of continual flux—that there are many causes in action which tend to the extinction of species, and which are conclusive against the doctrine of their unlimited durability.

There are also causes which give rise to new varieties and races in plants and animals, and new forms are continually supplanting others which had endured for ages. But natural history has been successfully cultivated for so short a period, that a few examples only of local, and perhaps but one or two of absolute, extirpation of species can as yet be proved, and these only where the interference of man has been conspicuous. It will nevertheless appear evident, from the facts and arguments detailed in the chapters which treat of the geographical distribution of species in the next volume, that man is not the only exterminating agent; and that, independently of his intervention, the annihilation of species is promoted by the multiplication and gradual diffusion of every animal or plant. It will also appear that every alteration in the physical geography and climate of the globe cannot fail to have the same tendency. If we proceed still farther, and inquire whether new species are substituted from time to time for those which die out, we find that the successive introduction of new forms appears to have been a constant part of the economy of the terrestrial system, and if we have no direct

proof of the fact it is because the changes take place so slowly as not to come within the period of exact scientific observation. To enable the reader to appreciate the gradual manner in which a passage may have taken place from an extinct fauna to that now living, I shall say a few words on the fossils of successive Tertiary periods. When we trace the series of formations from the more ancient to the more modern, it is in these Tertiary deposits that we first meet with assemblages of organic remains having a near analogy to the fauna of certain parts of the globe in our own time. In the Eocene, or oldest subdivisions, some few of the testacea belong to existing species, although almost all of them, and apparently all the associated vertebrata, are now extinct. These Eocene strata are succeeded by a great number of more modern deposits, which depart gradually in the character of their fossils from the Eocene type, and approach more and more to that of the living creation. In the present state of science, it is chiefly by the aid of shells that we are enabled to arrive at these results, for of all classes the testacea are the most generally diffused in a fossil state, and may be called the medals principally employed by nature in recording the chronology of past events. In the Upper Miocene rocks (No. 5 of the table, p. 135) we begin to find a considerable number, although still a minority, of recent species, intermixed with some fossils common to the preceding, or Eocene, epoch. We then arrive at the Pliocene strata, in which species now contemporary with man begin to preponderate, and in the newest of which nine-tenths of the fossils agree with species still inhabiting the neighbouring sea. It is in the Post-Tertiary strata, where all the shells agree with species now living, that we have discovered the first or earliest known remains of man associated with the bones of quadrupeds, some of which are of extinct species.

In thus passing from the older to the newer members of the Tertiary system, we meet with many chasms, but none which separate entirely, by a broad line of demarcation, one state of the organic world from another. There are no signs of an abrupt termination of one fauna and flora, and the starting into life of new and wholly distinct forms. Although we are far from being able to demonstrate geologically an insensible transition from the Eocene to the Miocene, or even from the latter to the recent fauna, yet the more we enlarge and perfect our general survey, the more nearly do we approximate to such a continuous series, and the more gradually are we conducted from times when many of the genera and nearly all the species were extinct, to

those in which scarcely a single species flourished, which we do not know to exist at present. Dr. A. Philippi, indeed, after an elaborate comparison of the fossil tertiary shells of Sicily with those now living in the Mediterranean, announced, as the result of his examination, that there are strata in that island which attest a very gradual passage from a period when only thirteen in a hundred of the shells were like the species now living in the sea, to an era when the recent species had attained a proportion of ninety-five in a hundred. There is, therefore, evidence, he says, in Sicily of this revolution in the animate world having been effected "without the intervention of any convulsion or abrupt changes, certain species having from time died out, and others having been introduced, until at length the existing fauna was elaborated."

In no part of Europe is the absence of all signs of man or his works, in strata of comparatively modern date, more striking than in Sicily. In the central parts of that island we observe a lofty table-land and hills, sometimes rising to the height of 3,000 feet, capped with a limestone, in which from 70 to 85 per cent of the fossil testacea are specifically identical with those now inhabiting the Mediterranean. These calcareous and other argillaceous strata of the same age are intersected by deep valleys which appear to have been gradually formed by denudation, but have not varied materially in width or depth since Sicily was first colonized by the Greeks. The limestone, moreover, which is of so late a date in geological chronology, was quarried for building those ancient temples of Girgenti and Syracuse, of which the ruins carry us back to a remote era in human history. If we are lost in conjectures when speculating on the ages required to lift up these formations to the height of several thousand feet above the sea, and to excavate the valleys, how much more remote must be the era when the same rocks were gradually formed beneath the waters!

The intense cold of the Glacial period was spoken of in the tenth chapter. Although we have not yet succeeded in detecting proofs of the origin of man antecedently to that epoch, we have yet found evidence that most of the testacea, and not a few of the quadrupeds, which preceded, were of the same species as those which followed the extreme cold. To whatever local disturbances this cold may have given rise in the distribution of species, it seems to have done little in effecting their annihilation. We may conclude, therefore, from a survey of the tertiary and modern strata, which constitute a more complete and unbroken series than rocks of older date, that the extinction and creation of species

have been, and are, the result of a slow and gradual change in the organic world.

Uniformity of change considered, thirdly, in reference to subterranean movements.—Thirdly, to pass on to the last of the three topics before proposed for discussion, the reader will find, in the account given in the Second Book, Vol. II., of the earthquakes recorded in history, that certain countries have, from time immemorial, been rudely shaken again and again; while others, comprising by far the largest part of the globe, have remained to all appearance motionless. In the regions of convulsion rocks have been rent asunder, the surface has been forced up into ridges, chasms have opened, or the ground throughout large spaces has been permanently lifted up above or let down below its former level. In the regions of tranquility some areas have remained at rest, but others have been ascertained, by a comparison of measurements made at different periods, to have arisen by an insensible motion, as in Sweden, or to have subsided very slowly, as in Greenland. That these same movements, whether ascending or descending, have continued for ages in the same direction has been established by historical or geological evidence. Thus we find on the opposite coasts of Sweden that brackish water deposits, like those now forming in the Baltic, occur on the eastern side, and upraised strata filled with purely marine shells, now proper to the ocean, on the western coast. Both of these have been lifted up to an elevation of several hundred feet above high-water mark. The rise within the historical period has not amounted to many yards, but the greater extent of antecedent upheaval is proved by the occurrence in inland spots, several hundred feet high, of deposits filled with fossil shells of species now living either in the ocean or the Baltic.

It must in general be more difficult to detect proofs of slow and gradual subsidence than of elevation, but the theory which accounts for the form of circular coral reefs and lagoon islands, and which will be explained in the concluding chapter of this work, will satisfy the reader that there are spaces on the globe, several thousand miles in circumference, throughout which the downward movement has predominated for ages, and yet the land has never, in a single instance, gone down suddenly for several hundred feet at once. Yet geology demonstrates that the persistency of subterranean movements in one direction has not been perpetual throughout all past time. There have been great oscillations of level, by which a surface of dry land has been submerged to

a depth of several thousand feet, and then at a period long subsequent raised again and made to emerge. Nor have the regions now motionless been always at rest; and some of those which are at present the theatres of reiterated earthquakes have formerly enjoyed a long continuance of tranquility. But, although disturbances have ceased after having long prevailed, or have recommenced after a suspension for ages, there has been no universal disruption of the earth's crust or desolation of the surface since times the most remote. The non-occurrence of such a general convulsion is proved by the perfect horizontality now retained by some of the most ancient fossiliferous strata throughout wide areas.

That the subterranean forces have visited different parts of the globe at successive periods is inferred chiefly from the unconformability of strata belonging to groups of different ages. Thus, for example, on the borders of Wales and Shropshire, we find the slaty beds of the ancient Silurian system inclined and vertical, while the beds of the overlying carboniferous shale and sandstone are horizontal. All are agreed that in such a case the older set of strata had suffered great disturbance before the deposition of the newer or carboniferous beds, and that these last have never since been violently fractured, nor have ever been bent into folds, whether by sudden or continuous lateral pressure. On the other hand, the more ancient or Silurian group suffered only a local derangement, and neither in Wales nor elsewhere are all the rocks of that age found to be curved or vertical.

In various parts of Europe, for example, and particularly near Lake Wener in the south of Sweden, and in many parts of Russia, the Silurian strata maintain the most perfect horizontality; and a similar observation may be made respecting limestones and shales of like antiquity in the great lake district of Canada and the United States. These older rocks are still as flat and horizontal as when first formed; yet, since their origin, not only have most of the actual mountain-chains been uplifted, but some of the very rocks of which those mountains are composed have been formed, some of them by igneous and others by aqueous action.

It would be easy to multiply instances of similar unconformability in formations of other ages; but a few more will suffice. The carboniferous rocks before alluded to as horizontal on the borders of Wales are vertical in the Mendip hills in Somersetshire, where the overlying beds of the New Red Sandstone are horizontal. Again, in the Wolds

of Yorkshire the last-mentioned sandstone supports on its curved and inclined beds the horizontal Chalk. The Chalk again is vertical on the flanks of the Pyrenees, and the tertiary strata repose unconformably upon it.

As almost every country supplies illustrations of the same phenomena, they who advocate the doctrine of alternate periods of disorder and repose may appeal to the facts above described, as proving that every district has been by turns convulsed by earthquakes and then respited for ages from convulsions. But so it might with equal truth be affirmed that every part of Europe has been visited alternately by winter and summer, although it has always been winter and always summer in some part of the planet, and neither of these seasons has ever reigned simultaneously over the entire globe. They have been always shifting from place to place; but the vicissitudes which recur thus annually in a single spot are never allowed to interfere with the invariable uniformity of seasons throughout the whole planet.

So, in regard to subterranean movements, the theory of the perpetual uniformity of the force which they exert on the earth's crust is quite consistent with the admission of their alternate development and suspension for long and indefinite periods within limited geographical areas.

If, for reasons before stated, we assume a continual extinction of species and appearance of others on the globe, it will then follow that the fossils of strata formed at two distant periods on the same spot will differ even more certainly than the mineral composition of those strata. For rocks of the same kind have sometimes been reproduced in the same district after a long interval of time; whereas all the evidence derived from fossil remains is in favour of the opinion that species which have once died out have never been reproduced. The submergence, then, of land must be often attended by the commencement of a new class of sedimentary deposits, characterized by a new set of fossil animals and plants, while the reconversion of the bed of the sea into land may arrest at once and for an indefinite time the formation of geological monuments. Should the land again sink, strata will again be formed; but one or many entire revolutions in animal or vegetable life may have been completed in the interval.

As to the want of completeness in the fossiliferous series, which may be said to be almost universal, we have only to reflect on what has been already said of the laws governing sedimentary deposition, and

those which give rise to fluctuations in the animate world, to be convinced that a very rare combination of circumstances can alone give rise to such a superposition and preservation of strata as will bear testimony to the gradual passage from one state of organic life to another. To produce such strata nothing less will be requisite than the fortunate coincidence of the following conditions: first, a never-failing supply of sediment in the same region throughout a period of vast duration; secondly, the fitness of the deposit in every part for the permanent preservation of imbedded fossils; and, thirdly, a gradual subsidence to prevent the sea or lake from being filled up and converted into land.

It will appear in the chapter on coral reefs, that, in certain parts of the Pacific and Indian Oceans, most of these conditions, if not all, are complied with, and the constant growth of coral, keeping pace with the sinking of the bottom of the sea, seems to have gone on so slowly, for such indefinite periods, that the signs of a gradual change in organic life might probably be detected in that quarter of the globe if we could explore its submarine geology. Instead of the growth of coralline limestone, let us suppose, in some other place, the continuous deposition of fluviatile mud and sand, such as the Ganges and Brahmapootra have poured for thousands of years into the Bay of Bengal. Part of this bay, although of considerable depth, might at length be filled up before an appreciable amount of change was effected in the fish, mollusca, and other inhabitants of the sea and neighbouring land. But if the bottom be lowered by sinking at the same rate that it is raised by fluviatile mud, the bay can never be turned into dry land. In that case one new layer of matter may be superimposed upon another for a thickness of many thousand feet, and the fossils of the inferior beds may differ greatly from those entombed in the uppermost, yet every intermediate gradation may be indicated in the passage from an older to a newer assemblage of species. Granting, however, that such an unbroken sequence of monuments may thus be elaborated in certain parts of the sea, and that the strata happen to be all of them well adapted to preserve the included fossils from decomposition, how many accidents must still concur before these submarine formations will be laid open to our investigation! The whole deposit must first be raised several thousand feet, in order to bring into view the very foundation; and during the process of exposure the superior beds must not be entirely swept away by denudation.

In the first place, the chances are nearly as three to one against the

mere emergence of the mass above the waters, because nearly three-fourths of the globe are covered by the ocean. But if it be upheaved and made to constitute part of the dry land, it must also, before it can be available for our instruction, become part of that area already surveyed by geologists. In this small fraction of land already explored, and still very imperfectly known, we are required to find a set of strata deposited under peculiar conditions, and which, having been originally of limited extent, would have been probably much lessened by subsequent denudation.

Yet it is precisely because we do not encounter at every step the evidence of such gradations from one state of the organic world to another, that so many geologists have embraced the doctrine of great and sudden revolutions in the history of the animate world. Not content with simply availing themselves, for the convenience of classification, of those gaps and chasms which here and there interrupt the continuity of the chronological series, as at present known, they deduce, from the frequency of these breaks in the chain of records, an irregular mode of succession in the events themselves, both in the organic and inorganic world. But, besides that some links of the chain which once existed are now entirely lost and others concealed from view, we have good reason to suspect that it was never complete originally. It may undoubtedly be said that strata have been always forming somewhere, and therefore at every moment of past time Nature has added a page to her archives; but, in reference to this subject, it should be remembered that we can never hope to compile a consecutive history by gathering together monuments which were originally detached and scattered over the globe. For, as the species of organic beings contemporaneously inhabiting remote regions are distinct, the fossils of the first of several periods which may be preserved in any one country, as in America for example, will have no connection with those of a second period found in India, and will therefore no more enable us to trace the signs of a gradual change in the living creation, than a fragment of Chinese history will fill up a blank in the political annals of Europe.

The absence of any deposits of importance containing recent shells in Chili, or anywhere on the western shore of South America, naturally led Mr. Darwin to the conclusion that "where the bed of the sea is either stationary or rising, circumstances are far less favourable than where the level is sinking to the accumulation of conchiferous strata of sufficient thickness and extension to resist the average vast amount of

denudation." In like manner the beds of superficial sand, clay, and gravel, with recent shells, on the coasts of Norway and Sweden, where the land has risen in Post-tertiary times, are so thin and scanty as to incline us to admit a similar proposition. We may in fact assume that in all cases where the bottom of the sea has been undergoing continuous elevation, the total thickness of sedimentary matter accumulating at depths suited to the habitation of most of the species of shells can never be great, nor can the deposits be thickly covered with superincumbent matter, so as to be consolidated by pressure. When they are upheaved, therefore, the waves on the beach will bear down and disperse the loose materials; whereas, if the bed of the sea subsides slowly, a mass of strata containing abundance of such species as live at moderate depths, may be formed and may increase in thickness to any amount. It may also extend horizontally over a broad area, as the water gradually encroaches on the subsiding land.

Hence it will follow that great violations of continuity in the chronological series of fossiliferous rocks will always exist, and the imperfection of the record, though lessened, will never be removed by future discoveries. For not only will no deposits originate on the dry land, but those formed in the sea near land, which is undegoing constant upheaval, will usually be too slight in thickness to endure for ages.

In proportion as we become acquainted with larger geographical areas, many of the gaps, by which a chronological table, like that given at page 135, is rendered defective, will be removed. We were enabled by aid of the labours of Prof. Sedgwick and Sir Roderick Murchison, to intercalate, in 1838, the marine strata of the Devonian period, with their fossil shells, corals, and fish, between the Silurian and Carboniferous rocks. Previously the marine fauna of these last-mentioned formations wanted the connecting links which now render the passage from the one to the other much less abrupt. In like manner the Upper Miocene has no representative in England, but in France, Germany, and Switzerland it constitutes a most instructive link between the living creation and the middle of the great Tertiary period. Still we must expect, for reasons before stated, that chasms will forever continue to occur, in some parts of our sedimentary series.

Concluding remarks on the consistency of the theory of gradual change with the existence of great breaks in the series.—To return to the general argument pursued in this chapter, it is assumed, for reasons above explained, that a slow change of species is in simultaneous opera-

tion everywhere throughout the habitable surface of sea and land; whereas the fossilization of plants and animals is confined to those areas where new strata are produced. These areas, as we have seen, are always shifting their position, so that the fossilizing process, by means of which the commemoration of the particular state of the organic world, at any given time, is effected, may be said to move about, visiting and revisiting different tracts in succession.

To make still more clear the supposed working of this machinery, I shall compare it to a somewhat analogous case that might be imagined to occur in the history of human affairs. Let the mortality of the population of a large country represent the successive extinction of species, and the births of new individuals the introduction of new species. While these fluctuations are gradually taking place everywhere, suppose commissioners to be appointed to visit each province of the country in succession, taking an exact account of the number, names and individual peculiarities of all the inhabitants, and leaving in each district a register containing a record of this information. If, after the completion of one census, another is immediately made on the same plan, and then another, there will at last be a series of statistical documents in each province. When those belonging to any one province are arranged in chronological order, the contents of such as stand next to each other will differ according to the length of the intervals of time between the taking of each census. If, for example, there are sixty provinces, and all the registers are made in a single year and renewed annually, the number of births and deaths will be so small, in proportion to the whole of the inhabitants, during the interval between the compiling of two consecutive documents, that the individuals described in such documents will be nearly identical; whereas, if the survey of each of the sixty provinces occupies all the commissioners for a whole year, so that they are unable to revisit the same place until the expiration of sixty years, there will then be an almost entire discordance between the persons enumerated in two consecutive registers in the same province. There are, undoubtedly, other causes, besides the mere quantity of time, which may augment or diminish the amount of discrepancy. Thus, at some periods, a pestilential disease may have lessened the average duration of human life; or a variety of circumstances may have caused the births to be unusually numerous, and the population to multiply; or a province may be suddenly colonized by persons migrating from surrounding districts.

These exceptions may be compared to the accelerated rate of fluc-

tuations in the fauna and flora of a particular region, in which the climate and physical geography may be undergoing an extraordinary degree of alteration.

But I must remind the reader that the case above proposed has no pretensions to be regarded as an exact parallel to the geological phenomena which I desire to illustrate; for the commissioners are supposed to visit the different provinces in rotation; whereas the commemorating processes by which organic remains become fossilized, although they are always shifting from one area to the other, are yet very irregular in their movements. They may abandon and revisit many spaces again and again, before they once approach another district; and, besides this source of irregularity, it may often happen that, while the depositing process is suspended, denudation may take place, which may be compared to the occasional destruction by fire or other causes of some of the statistical documents before mentioned. It is evident that where such accidents occur the want of continuity in the series may become indefinitely great, and that the monuments which follow next in succession will by no means be equidistant from each other in point of time.

If this train of reasoning be admitted, the occasional distinctness of the fossil remains, in formations immediately in contact, would be a necessary consequence of the existing laws of sedimentary deposition and subterranean movement, accompanied by a constant dying-out and renovation of species.

As all the conclusions above insisted on are directly opposed to opinions still popular, I shall add another comparison, in the hope of preventing any possible misapprehension of the argument. Suppose we had discovered two buried cities at the foot of Vesuvius, immediately superimposed upon each other, with a great mass of tuff and lava intervening, just as Portici and Resina, if now covered with ashes, would overlie Herculaneum. An antiquary might possibly be entitled to infer, from the inscriptions on public edifices, that the inhabitants of the inferior and older city were Greeks, and those of the modern towns Italians. But he would reason very hastily if he also concluded from these data, that there had been a sudden change from the Greek to the Italian language in Campania. But if he afterwards found three buried cities, one above the other, the intermediate one being Roman, while, as in the former example, the lowest was Greek and the uppermost Italian, he would then perceive the fallacy of his former opinion, and

would begin to suspect that the catastrophes, by which the cities were inhumed might have no relation whatever to the fluctuations in the language of the inhabitants; and that, as the Roman tongue had evidently intervened between the Greek and Italian, so many other dialects may have been spoken in succession, and the passage from the Greek to the Italian may have been very gradual, some terms growing obsolete, while others were introduced from time to time.

If this antiquary could have shown that the volcanic paroxysms of Vesuvius were so governed as that cities should be buried one above the other, just as often as any variation occurred in the language of the inhabitants, then, indeed, the abrupt passage from a Greek to a Roman, and from a Roman to an Italian city, would afford proof of fluctuations no less sudden in the language of the people.

So, in Geology, if we could assume that it is part of the plan of Nature to preserve, in every region of the globe, an unbroken series of monuments to commemorate the vicissitudes of the organic creation, we might infer the sudden extirpation of species, and the simultaneous introduction of others, as often as two formations in contact are found to include dissimilar organic fossils. But we must shut our eyes to the whole economy of the existing causes, aqueous, igneous, and organic, if we fail to perceive that such is not the plan of Nature.

I shall now conclude the discussion of a question with which we have been occupied since the beginning of the fifth chapter—namely, whether there has been any interruption, from the remotest periods, of one uniform and continuous system of change in the animate and inanimate world. We were induced to enter into that inquiry by reflecting how much the progress of opinion in Geology had been influenced by the assumption that the analogy was slight in kind, and still more slight in degree, between the causes which produced the former revolutions of the globe, and those now in every-day operation. It appeared clear that the earlier geologists had not only a scanty acquaintance with existing changes, but were singularly unconscious of the amount of their ignorance. With the presumption naturally inspired by this unconsciousness, they had no hesitation in deciding at once that time could never enable the existing powers of nature to work out changes of great magnitude, still less such important revolutions as those which are brought to light by Geology. They therefore felt themselves at liberty to indulge their imaginations in guessing at what might be, rather than inquiring what is; in other words, they employed themselves in con-

jecturing what might have been the course of Nature at a remote period, rather than in the investigation of what was the course of Nature in their own times.

It appeared to them far more philosophical to speculate on the possibilities of the past, than patiently to explore the realities of the present; and having invented theories under the influence of such maxims, they were consistently unwilling to test their validity by the criterion of their accordance with the ordinary operations of Nature. On the contrary, the claims of each new hypothesis to credibility appeared enhanced by the great contrast, in kind or intensity, of the causes referred to and those now in operation.

Never was there a dogma more calculated to foster indolence, and to blunt the keen edge of curiosity, than this assumption of the discordance between the ancient and existing causes of change. It produced a state of mind unfavourable in the highest degree to the candid reception of the evidence of those minute but incessant alterations which every part of the earth's surface is undergoing, and by which the condition of its living inhabitants is continually made to vary. The student, instead of being encouraged with the hope of interpreting the enigmas presented to him in the earth's structure—instead of being prompted to undertake laborious inquiries into the natural history of the organic world, and the complicated effects of the igneous and aqueous causes now in operation—was taught to despond from the first. Geology, it was affirmed, could never rise to the rank of an exact science; the greater number of phenomena must forever remain inexplicable, or only be partially elucidated by ingenious conjectures. Even the mystery which invested the subject was said to constitute one of its principal charms, affording, as it did, full scope to the fancy to indulge in a boundless field of speculation.

The course directly opposed to this method of philosophizing consists in an earnest and patient inquiry, how far geological appearances are reconcilable with the effect of changes now in progress, or which may be in progress in regions inaccessible to us, but of which the reality is attested by volcanoes and subterranean movements. It also endeavours to estimate the aggregate result of ordinary operations multiplied by time, and cherishes a sanguine hope that the resources to be derived from observation and experiment, or from the study of Nature such as she now is, are very far from being exhausted. For this reason all theories are rejected which involve the assumption of sudden and violent

catastrophes and revolutions of the whole earth, and its inhabitants—theories which are restrained by no reference to existing analogies, and in which a desire is manifested to cut, rather than patiently to untie, the Gordian knot.

We have now, at least, the advantage of knowing, from experience, that an opposite method has always put geologists on the road that leads to truth—suggesting views which, although imperfect at first, have been found capable of improvement, until at last adopted by universal consent; while the method of speculating on a former distinct state of things and causes has led invariably to a multitude of contradictory systems, which have been overthrown one after the other—have been found incapable of modification—and which have often required to be precisely reversed.

The remainder of this work will be devoted to an investigation of the changes now going on in the crust of the earth and its inhabitants. The importance which the student will attach to such researches will mainly depend on the degree of confidence which he feels in the principles above expounded. If he firmly believes in the resemblance or identity of the ancient and present system of terrestrial changes, he will regard every fact collected respecting the causes in diurnal action as affording him a key to the interpretation of some mystery in the past. Events which have occurred at the most distant periods in the animate and inanimate world will be acknowledged to throw light on each other, and the deficiency of our information respecting some of the most obscure parts of the present creation will be removed. For as, by studying the external configuration of the existing land and its inhabitants, we may restore in imagination the appearance of the ancient continents which have passed away, so may we obtain from the deposits of ancient seas and lakes an insight into the nature of the subaqueous processes now in operation, and of many forms of organic life which, though now existing, are veiled from sight. Rocks, also, produced by subterranean fire in former ages, at great depths in the bowels of the earth, present us, when upraised by gradual movements, and exposed to the light of heaven, with an image of those changes which the deep-seated volcano may now occasion in the nether regions. Thus, although we are mere sojourners on the surface of the planet, chained to a mere point in space, enduring but for a moment of time, the human mind is not only enabled to number worlds beyond the unassisted ken of mortal eye, but to trace the events of indefinite ages before the creation of our race, and is not

even withheld from penetrating into the dark secrets of the ocean, or the interior of the solid globe; free, like the spirit which the poet described as animating the universe,

———*ire per omnes*
Terrasque, tractusque maris, coelumque profundum.

THEODOR SCHWANN

Theodor Schwann was born at Neuss in Prussia, Dec. 7, 1810. His father was the founder of an important printing establishment. Johannes Mueller at Bonn and then at Berlin considerably influenced him and at last persuaded him to take up science instead of medicine, appointing him assistant in the anatomical museum. In 1838 he was called to the Catholic university at Louvain, and then to Liége.

He was one of the first to work toward a chemical explanation of life. He discovered the presence and use as a ferment of pepsin in digestion and in 1839 developed his great theory that all life is built up of cells, that is, that the body is an organized society of a vast number of interconnected cellular units.

The importance of this theory can hardly be estimated. It gave an entirely new view to animal and vegetable life.

Schwann died Jan. 11, 1882.

CELL THEORY

The whole of the foregoing investigation has been conducted with the object of exhibiting from observation alone the mode in which the elementary parts of organized bodies are formed. Theoretical views have been either entirely excluded, or where they were required (as in the foregoing retrospect of the cell-life), for the purpose of rendering facts more clear, or preventing subsequent repetitions, they have been so presented that it can be easily seen how much is observation and how much argument. But a question inevitably arises as to the basis of all these phenomena; and an attempt to solve it will be more readily

permitted us, since by making a marked separation between theory and observation the hypothetical may be clearly distinguished from that which is positive. An hypothesis is never prejudicial so long as we are conscious of the degree of reliance which may be placed upon it, and of the grounds on which it rests. Indeed it is advantageous, if not necessary for science, that when a certain series of phenomena is proved by observation, some provisional explanation should be conceived that will suit them as nearly as possible, even though it be in danger of being overthrown by subsequent observations; for it is only in this manner that we are rationally led to new discoveries, which either establish or refute the explanation. It is from this point of view I would beg that the following theory of organization may be regarded; for the inquiry into the source of development of the elementary parts of organisms is, in fact, identical with the theory of organized bodies.

The various opinions entertained with respect to the fundamental powers of an organized body may be reduced to two, which are essentially different from one another. The first is, that every organism originates with an inherent power, which models it into conformity with a predominant idea, arranging the molecules in the relation necessary for accomplishing certain purposes held forth by this idea. Here, therefore, that which arranges and combines the molecules is a power acting with a definite purpose. A power of this kind would be essentially different from all the powers of inorganic nature, because action goes on in the latter quite blindly. A certain impression is followed of necessity by a certain change of quality and quantity, without regard to any purpose. In this view, however, the fundamental power of the organism (or the soul, in the sense employed by Stahl) would, inasmuch as it works with a definite individual purpose, be much more nearly allied to the immaterial principle, endued with consciousness which we must admit operates in man.

The other view is, that the fundamental powers of organized bodies agree essentially with those of inorganic nature, that they work altogether blindly according to laws of necessity and irrespective of any purpose, that they are powers which are as much established with the existence of matter as the physical powers are. It might be assumed that the powers which form organized bodies do not appear at all in inorganic nature, because this or that particular combination of molecules, by which the powers are elicited, does not occur in inorganic nature, and yet they might not be essentially distinct from physical and

chemical powers. It cannot, indeed, be denied that adaptation to a particular purpose, in some individuals even in a high degree, is characteristic of every organism; but, according to this view, the source of this adaptation does not depend upon each organism being developed by the operation of its own power in obedience to that purpose, but it originates as in inorganic nature, in the creation of the matter with its blind powers by a rational Being. We know, for instance, the powers which operate in our planetary system. They operate, like all physical powers, in accordance with blind laws of necessity, and yet is the planetary system remarkable for its adaptation to a purpose. The ground of this adaptation does not lie in the powers, but in Him, who has so constituted matter with its powers, that in blindly obeying its laws it produces a whole suited to fulfil an intended purpose. We may even assume that the planetary system has an individual adaptation to a purpose. Some external influence, such as a comet, may occasion disturbances of motion, without thereby bringing the whole into collision; derangements may occur on single planets, such as a high tide, &c., which are yet balanced entirely by physical laws. As respects their adaptation to a purpose, organized bodies differ from these in degree only; and by this second view we are just as little compelled to conclude that the fundamental powers of organization operate according to laws of adaptation to a purpose, as we are in inorganic nature.

The first view of the fundamental powers of organized bodies may be called the teleological, the second the physical view. An example will show at once, how important for physiology is the solution of the question as to which is to be followed. If, for instance, we define inflammation and suppuration to be the effort of the organism to remove a foreign body that has been introduced into it; or fever to be the effort of the organism to eliminate diseased matter, and both as the result of the "autocracy of the organism," then these explanations accord with the teleological view. For, since by these processes the obnoxious matter is actually removed, the process which effects them is one adapted to an end; and as the fundamental power of the organism operates in accordance with definite purposes, it may either set these processes in action primarily, or may also summon further powers of matter to its aid, always, however, remaining itself the "primum movens." On the other hand, according to the physical view, this is just as little an explanation as it would be to say, that the motion of the earth around the sun is an effort of the fundamental power of the planetary system

to produce a change of seasons on the planets, or to say, that ebb and flood are the reaction of the organism of the earth upon the moon.

In physics, all those explanations which were suggested by a teleological view of nature, as "horror vacui," and the like, have long been discarded. But in animated nature, adaptation—individual adaptation—to a purpose is so prominently marked, that it is difficult to reject all teleological explanations. Meanwhile it must be remembered that those explanations, which explain at once all and nothing, can be but the last resources, when no other view can possibly be adopted; and there is no such necessity for admitting the teleological view in the case of organized bodies. The adaptation to a purpose which is characteristic of organized bodies differs only in degree from what is apparent also in the inorganic part of nature; and the explanation that organized bodies are developed, like all the phenomena of inorganic nature, by the operation of blind laws framed with the matter, cannot be rejected as impossible. Reason certainly requires some ground for such adaptation, but for her it is sufficient to assume that matter with the powers inherent in it owes its existence to a rational Being. Once established and preserved in their integrity, these powers may, in accordance with their immutable laws of blind necessity, very well produce combinations, which manifest, even in a high degree, individual adaptation to a purpose. If, however, rational power interpose after creation merely to sustain, and not as an immediately active agent, it may, so far as natural science is concerned, be entirely excluded from the consideration of the creation.

But the teleological view leads to further difficulties in the explanation, and especially with respect to generation. If we assume each organism to be formed by a power which acts according to a certain predominant idea, a portion of this power may certainly reside in the ovum during generation; but then we must ascribe to this subdivision of the original power, at the separation of the ovum from the body of the mother, the capability of producing an organism similar to that which the power, of which it is but a portion, produced: that is, we must assume that this power is infinitely divisible, and yet that each part may perform the same actions as the whole power. If, on the other hand, the power of organized bodies reside, like the physical powers, in matter as such, and be set free only by a certain combination of the molecules, as, for instance, electricity is set free by the combination of a zinc and copper plate, then also by the conjunction of molecules to

form an ovum the power may be set free, by which the ovum is capable of appropriating to itself fresh molecules, and these newly-conjoined molecules again by this very mode of combination acquire the same power to assimilate fresh molecules. The first development of the many forms of organized bodies—the progressive formation of organic nature indicated by geology—is also much more difficult to understand according to the teleological than the physical view.

Another objection to the teleological view may be drawn from the foregoing investigation. The molecules, as we have seen, are not immediately combined in various ways, as the purpose of the organism requires, but the formation of the elementary parts of organic bodies is regulated by laws which are essentially the same for all elementary parts. One can see no reason why this should be the case, if each organism be endued with a special power to frame the parts according to the purpose which they have to fulfil: it might much rather be expected that the formative principle, although identical for organs physiologically the same, would yet in different tissues be correspondingly varied. This resemblance of the elementary parts has, in the instance of plants, already led to the conjecture that the cells are really the organisms, and that the whole plant is an aggregate of these organisms arranged according to certain laws. But since the elementary parts of animals bear exactly similar relations, the individuality of an entire animal would thus be lost; and yet precisely upon the individuality of the whole animal does the assumption rest, that it possesses a single fundamental power operating in accordance with a definite idea.

Meanwhile we cannot altogether lay aside teleological views if all phenomena are not clearly explicable by the physical view. It is, however, unnecessary to do so, because an explanation, according to the teleological view, is only admissible when the physical can be shown to be impossible. In any case it conduces much more to the object of science to strive, at least, to adopt the physical explanation. And I would repeat that, when speaking of a physical explanation of organic phenomena, it is not necessary to understand an explanation by known physical powers, such, for instance, as that universal refuge electricity, and the like; but an explanation by means of powers which operate like the physical powers, in accordance with strict laws of blind necessity, whether they be also to be found in inorganic nature or not.

We set out, therefore, with the supposition that an organized body is not produced by a fundamental power which is guided in its operation

by a definite idea, but is developed, according to blind laws of necessity, by powers which, like those of inorganic nature, are established by the very existence of matter. As the elementary materials of organic nature are not different from those of the inorganic kingdom, the source of the organic phenomena can only reside in another combination of these materials, whether it be in a peculiar mode of union of the elementary atoms to form atoms of the second order, or in the arrangement of these conglomerate molecules when forming either the separate morphological elementary parts of organisms, or an entire organism. We have here to do with the latter question solely, whether the cause of organic phenomena lies in the whole organism, or in its separate elementary parts. If this question can be answered, a further inquiry still remains as to whether the organism or its elementary parts possess this power through the peculiar mode of combination of the conglomerate molecules, or through the mode in which the elementary atoms are united into conglomerate molecules.

We may, then, form the two following ideas of the cause of organic phenomena, such as growth, &c. First, that the cause resides in the totality of the organism. By the combination of the molecules into a systematic whole, such as the organism is in every stage of its development, a power is engendered, which enables such an organism to take up fresh material from without, and appropriate it either to the formation of new elementary parts, or to the growth of those already present. Here, therefore, the cause of the growth of the elementary parts resides in the totality of the organism. The other mode of explanation is, that growth does not ensue from a power resident in the entire organism, but that each separate elementary part is possessed of an independent power, an independent life, so to speak; in other words, the molecules in each separate elementary part are so combined as to set free a power by which it is capable of attracting new molecules, and so increasing, and the whole organism subsists only by means of the reciprocal action of the single elementary parts. So that here the single elementary parts only exert an active influence on nutrition, and totality of the organism may indeed be a condition, but is not in this view a cause.

In order to determine which of these two views is the correct one, we must summon to our aid the results of the previous investigation. We have seen that all organized bodies are composed of essentially similar parts, namely, of cells; that these cells are formed and grow in

accordance with essentially similar laws; and, therefore, that these processes must, in every instance, be produced by the same powers. Now, if we find that some of these elementary parts, not differing from the others, are capable of separating themselves from the organism, and pursuing an independent growth, we may thence conclude that each of the other elementary parts, each cell, is already possessed of power to take up fresh molecules and growth; and that, therefore, every elementary part possesses a power of its own, an independent life, by means of which it would be enabled to develop itself independently, if the relations which it bore to external parts were but similar to those in which it stands in the organism. The ova of animals afford us example of such independent cells, growing apart from the organism. It may, indeed, be said of the ova of higher animals, that after impregnation the ovum is essentially different from the other cells of the organism; that by impregnation there is a something conveyed to the ovum, which is more to it than an external condition for vitality, more than nutrient matter; and that it might thereby have first received its peculiar vitality, and therefore that nothing can be inferred from it with respect to the other cells. But this fails in application to those classes which consist only of female individuals, as well as with the spores of the lower plants; and, besides, in the inferior plants any given cell may be separated from the plant, and then grow alone. So that here are whole plants consisting of cells, which can be positively proved to have independent vitality. Now, as all cells grow according to the same laws, and consequently the cause of growth cannot in one case lie in the cell, and in another in the whole organism; and since it may be further proved that some cells, which do not differ from the rest in their mode of growth, are developed independently, we must ascribe to all cells an independent vitality, that is, such combinations of molecules as occur in any single cell, are capable of setting free the power by which it is enabled to take up fresh molecules. The cause of nutrition and growth resides not in the organism as a whole, but in the separate elementary parts—the cells. The failure of growth in the case of any particular cell, when separated from an organized body, is as slight an objection to this theory as it is an objection against the independent vitality of a bee, that it cannot continue long in existence after being separated from its swarm. The manifestation of the power which resides in the cell depends upon conditions to which it is subject only when in connexion with the whole (organism).

The question, then, as to the fundamental power of organized bodies resolves itself into that of the fundamental powers of the individual cells. We must now consider the general phenomena attending the formation of cells, in order to discover what powers may be presumed to exist in the cells to explain them. These phenomena may be arranged in two natural groups: first, those which relate to the combination of the molecules to form a cell, and which may be denominated the plastic phenomena of the cells; secondly, those which result from chemical changes either in the component particles of the cell itself, or in the surrounding cytoblastema, and which may be called metabolic phenomena (*to metabolikon,* implying that which is liable to occasion or to suffer change).

The general plastic appearances in the cells are, as we have seen, the following: at first a minute corpuscle is formed, (the nucleolus); a layer of substance (the nucleus) is then precipitated around it, which becomes more thickened and expanded by the continual deposition of fresh molecules between those already present. Deposition goes on more vigorously at the outer part of this layer than at the inner. Frequently the entire layer, or in other instances the outer part of it only, becomes condensed to a membrane, which may continue to take up new molecules in such a manner that it increases more rapidly in superficial extent than in thickness, and thus an intervening cavity is necessarily formed between it and the nucleolus. A second layer (cell) is next precipitated around this first, in which precisely the same phenomena are repeated, with merely the difference that in this case the processes, especially the growth of the layer and the formation of the space intervening between it and the first layer (the cell-cavity), go on more rapidly and more completely. Such were the phenomena in the formation of most cells; in some, however, there appeared to be only a single layer formed, while in others (those especially in which the nucleolus was hollow) there were three. The other varieties in the development of the elementary parts were (as we saw) reduced to these—that if two neighbouring cells commence their formation so near to one another that the boundaries of the layers forming around each of them meet at any spot, a common layer may be formed enclosing the two incipient cells. So at least the origin of nuclei, with two or more nucleoli, seemed explicable, by a coalescence of the first layers (corresponding to the nucleus), and the union of many primary cells into one secondary cell by a similar coalescence of the second layers (which correspond to the

cell). But the further development of these common layers proceeds as though they were only an ordinary single layer. Lastly, there were some varieties in the progressive development of the cells, which were referable to an unequal deposition of the new molecules between those already present in the separate layers. In this way modifications of form and division of the cells were explained. And among the number of the plastic phenomena in the cells we may mention, lastly, the formation of secondary deposits; for instances occur in which one or more new layers, each on the inner surface of the previous one, are deposited on the inner surface of a simple or of a secondary cell.

These are the most important phenomena observed in the formation and development of cells. The unknown cause, presumed to be capable of explaining these processes in the cells, may be called the plastic power of the cells. We will, in the next place, proceed to determine how far a more accurate definition of this power may be deduced from these phenomena.

In the first place, there is a power of attraction exerted in the very commencement of the cell, in the nucleolus, which occasions the addition of new molecules to those already present. We may imagine the nucleolus itself to be first formed by a sort of crystallization from out of a concentrated fluid. For if a fluid be so concentrated that the molecules of the substance in solution exert a more powerful mutual attraction than is exerted between them and the molecules of the fluid in which they are dissolved, a part of the solid substance must be precipitated. One can readily understand that the fluid must be more concentrated when new cells are being formed in it than when those already present have merely to grow. For if the cell is already partly formed, it exerts an attractive force upon the substance still in solution. There is then a cause for the deposition of this substance, which does not co-operate when no part of the cell is yet formed. Therefore, the greater the attractive force of the cell is, the less concentration of the fluid is required; while, at the commencement of the formation of a cell, the fluid must be more than concentrated. But the conclusion which may be thus directly drawn, as to the attractive power of the cell, may also be verified by observation. Wherever the nutrient fluid is not equally distributed in a tissue, the new cells are formed in that part into which the fluid penetrates first, and where, consequently, it is most concentrated. Upon this fact, as we have seen, depended the difference between the growth of organized and unorganized tissues. And this

confirmation of the foregoing conclusion by experience speaks also for the correctness of the reasoning itself.

The attractive power of the cells operates so as to effect the addition of new molecules in two ways,—first, in layers, and secondly, in such a manner in each layer that the new molecules are deposited between those already present. This is only an expression of the fact; the more simple law, by which several layers are formed and the molecules are not all deposited between those already present, cannot yet be explained. The formation of layers may be repeated once, twice, or thrice. The growth of the separate layers is regulated by a law, that the deposition of new molecules should be greatest at the part where the nutrient fluid is most concentrated. Hence the outer part particularly becomes condensed into a membrane both in the layer corresponding to the nucleus and in that answering to the cell, because the nutrient fluid penetrates from without, and consequently is more concentrated at the outer than at the inner part of each layer. For the same reason the nucleus grows rapidly, so long as the layer of the cell is not formed around it, but it either stops growing altogether, or at least grows much more slowly as soon as the cell-layer has surrounded it; because then the latter receives the nutrient matter first, and, therefore, in a more concentrated form. And hence the cell becomes, in a general sense, much more completely developed, while the nucleus-layer usually remains at a stage of development, in which the cell-layer had been in its earlier period. The addition of new molecules is so arranged that the layers increase more considerably in superficial extent than in thickness; and thus an intervening space is formed between each layer and the one preceding it, by which cells and nuclei are formed into actual hollow vesicles. From this it may be inferred that the deposition of new molecules is more active between those which lie side by side along the surface of the membrane, than between those which lie one upon the other in its thickness. Were it otherwise, each layer would increase in thickness, but there would be no intervening cavity between it and the previous one, there would be no vesicles, but a solid body composed of layers.

Attractive power is exerted in all the solid parts of the cell. This follows, not only from the fact that new molecules may be deposited everywhere between those already present, but also from the formation of secondary deposits. When the cavity of a cell is once formed, material may be also attracted from its contents and deposited in layers; and as this deposition takes place upon the inner surface of the mem-

brane of the cell, it is probably that which exerts the attractive influence. This formation of layers on the inner surface of the cell-membrane is, perhaps, merely a repetition of the same process by which, at an earlier period, nucleus and cell were precipitated as layers around the nucleolus. It must, however, be remarked that the identity of these two processes cannot be so clearly proved as that of the processes by which nucleus and cell are formed; more especially as there is a variety in the phenomena, for the secondary deposits in plants occur in spiral forms, while this has at least not yet been demonstrated in the formation of the cell-membrane and the nucleus, although by some botanical writers the cell-membrane itself is supposed to consist of spirals.

The power of attraction may be uniform throughout the whole cell, but it may also be confined to single spots; the deposition of new molecules is then more vigorous at these spots, and the consequence of this uneven growth of the cell-membrane is a change in the form of the cell.

The attractive power of the cells manifests a certain form of election in its operation. It does not take up all the substances contained in the surrounding cytoblastema, but only particular ones, either those which are analogous with the substance already present in the cell (assimilation), or such as differ from it in chemical properties. The several layers grow by assimilation, but when a new layer is being formed, different material from that of the previously-formed layer is attracted: for the nucleolus, the nucleus and cell-membrane are composed of materials which differ in their chemical properties.

Such are the peculiarities of the plastic power of the cells, so far as they can as yet be drawn from observation. But the manifestations of this power presuppose another faculty of the cells. The cytoblastema, in which the cells are formed, contains the elements of the materials of which the cell is composed, but in other combinations: it is not a mere solution of cell-material, but it contains only certain organic substances in solution. The cells, therefore, not only attract materials from out of the cytoblastema, but they must have the faculty of producing chemical changes in its constituent particles. Besides which, all the parts of the cell itself may be chemically altered during the process of its vegetation. The unknown cause of all these phenomena, which we comprise under the term metabolic phenomena of the cells, we will denominate the metabolic power.

The next point which can be proved is, that this power is an attri-

bute of the cells themselves, and that the cytoblastema is passive under it. We may mention vinous fermentation as an instance of this. A decoction of malt will remain for a long time unchanged; but as soon as some yeast is added to it, which consists partly of entire fungi and partly of a number of single cells, the chemical change immediately ensues. Here the decoction of malt is the cytoblastema; the cells clearly exhibit activity, the cytoblastema, in this instance even a boiled fluid, being quite passive during the change. The same occurs when any simple cells, as the spores of the lower plants, are sown in boiled substances.

In the cells themselves again, it appears to be the solid parts, the cell-membrane and the nucleus, which produce the change. The contents of the cell undergo similar and even more various changes than the external cytoblastema, and it is at least probable that these changes originate with the solid parts composing the cells, especially the cell-membrane, because the secondary deposits are formed on the inner surface of the cell-membrane, and other precipitates are generally formed in the first instance around the nucleus. It may therefore, on the whole, be said that the solid component particles of the cells possess the power of chemically altering the substances in contact with them.

The substances which result from the transformation of the contents of the cell are different from those which are produced by change in the external cytoblastema. What is the cause of this difference, if the metamorphosing power of the cell-membrane be limited to its immediate neighbourhood merely? Might we not much rather expect that converted substances would be found without distinction on the inner as on the outer surface of the cell-membrane? It might be said that the cell-membrane converts the substance in contact with it without distinction, and that the variety in the products of this conversion depends only upon a difference between the convertible substance contained in the cell and the external cytoblastema. But the question then arises, as to how it happens that the contents of the cell differ from the external cytoblastema. If it be true that the cell-membrane, which at first closely surrounds the nucleus, expands in the course of its growth, so as to leave an interspace between it and the cell, and that the contents of the cell consist of fluid which has entered this space merely by imbibition, they cannot differ essentially from the external cytoblastema. I think therefore that, in order to explain the distinction between the cell-contents and the external cytoblastema, we must ascribe to the cell-membrane not only the power in general of chemically altering the substances

which it is either in contact with, or has imbibed, but also of so separating them that certain substances appear on its inner, and others on its outer surface. The secretion of substances already present in the blood, as, for instance, of urea, by the cells with which the urinary tubes are lined, cannot be explained without such a faculty of the cells. There is, however, nothing so very hazardous in it, since it is a fact that different substances are separated in the decompositions produced by the galvanic pile. It might perhaps be conjectured from this peculiarity of the metabolic phenomena in the cells, that a particular position of the axes of the atoms composing the cell-membrane is essential for the production of these appearances.

Chemical changes occur, however, not only in the cytoblastema and the cell-contents, but also in the solid parts of which the cells are composed, particularly the cell-membrane. Without wishing to assert that there is any intimate connexion between the metabolic power of the cells and galvanism, I may yet, for the sake of making the representation of the process more clear, remark that the chemical changes produced by a galvanic pile are accompanied by corresponding changes in the pile itself.

The more obscure the cause of the metabolic phenomena in the cells is, the more accurately we must mark the circumstances and phenomena under which they occur. One condition to them is a certain temperature, which has a maximum and a minimum. The phenomena are not produced in a temperature below 0° or above 80° R.; boiling heat destroys this faculty of the cells permanently; but the most favorable temperature is one between 10° and 32° R. Heat is evolved by the process itself.

Oxygen, or carbonic acid, in a gaseous form or lightly confined, is essentially necessary to the metabolic phenomena of the cells. The oxygen disappears and carbonic acid is formed, or *vice versa*, carbonic acid disappears, and oxygen is formed. The universality of respiration is based entirely upon this fundamental condition to the metabolic phenomena of the cells. It is so important that, as we shall see further on, even the principal varieties of form in organized bodies are occasioned by this peculiarity of the metabolic process in the cells.

Each cell is not capable of producing chemical changes in every organic substance contained in solution, but only in particular ones. The fungi of fermentation, for instance, effect no changes in any other solutions than sugar; and the spores of certain plants do not become

developed in all substances. In the same manner it is probable that each cell in the animal body converts only particular constituents of the blood.

The metabolic power of the cells is arrested not only by powerful chemical actions, such as destroy organic substances in general, but also by matters which chemically are less uncongenial; for instance, concentrated solutions of neutral salts. Other substances, as arsenic, do so in less quantity. The metabolic phenomena may be altered in quality by other substances, both organic and inorganic, and a change of this kind may result even from mechanical impressions on the cells.

Such are the most essential characteristics of the fundamental powers of the cell, so far as they can as yet be deduced from the phenomena. And now, in order to comprehend distinctly in what the peculiarity of the formative process of a cell, and therefore in what the peculiarity of the essential phenomenon in the formation of organized bodies consists, we will compare this process with a phenomenon of inorganic nature as nearly as possible similar to it. Disregarding all that is specially peculiar to the formation of cells, in order to find a more general definition in which it may be included with a process occurring in inorganic nature, we may view it as a process in which a solid body of definite and regular shape is formed in a fluid at the expense of a substance held in solution by that fluid. The process of crystallization in inorganic nature comes also within this definition, and is, therefore, the nearest analogue to the formation of cells.

Let us now compare the two processes, that the difference of the organic process may be clearly manifest. First, with reference to the plastic phenomena, the forms of cells and crystals are very different. The primary forms of crystals are simple, always angular, and bounded by plane surfaces; they are regular, or at least symmetrical, and even the very varied secondary forms of crystals are almost, without exception, bounded by plane surfaces. But manifold as is the form of cells, they have very little resemblance to crystals; round surfaces predominate, and where angles occur, they are never quite sharp, and the polyhedral crystal-like form of many cells results only from mechanical causes. The structure too of cells and of crystals is different. Crystals are solid bodies, composed merely of layers placed one upon another; cells are hollow vesicles, either single, or several inclosed one within another. And if we regard the membranes of these vesicles as layers, there will still remain marks of difference between them and crystals;

these layers are not in contact, but contain fluid between them, which is not the case with crystals; the layers in the cells are few, from one to three only; and they differ from each other in chemical properties, while those of crystals consist of the same chemical substance. Lastly, there is also a great difference between crystals and cells in their mode of growth. Crystals grow by apposition, the new molecules are set only upon the surface of those already deposited, but cells increase also by intussusception, that is to say, the new molecules are deposited also between those already present.

But greatly as these plastic phenomena differ in cells and in crystals, the metabolic are yet more different, or rather they are quite peculiar to cells. For a crystal to grow, it must be already present as such in the solution, and some extraneous cause must interpose to diminish its solubility. Cells, on the contrary, are capable of producing a chemical change in the surrounding fluid, of generating matters which had not previously existed in it as such, but of which only the elements were present in another combination. They therefore require no extraneous influence to effect a change of solubility; for if they can produce chemical changes in the surrounding fluid, they may also produce such substances as could not be held in solution under the existing circumstances, and therefore need no external cause of growth. If a crystal be laid in a pretty strong solution, of a substance similar even to itself, nothing ensues without our interference, or the crystal dissolves completely: the fluid must be evaporated for the crystal to increase. If a cell be laid in a solution of a substance, even different from itself, it grows and converts this substance without our aid. And this it is from which the process going on in the cells (so long as we do not separate it into its several acts) obtains that magical character, to which attaches the idea of Life.

From this we perceive how very different are the phenomena in the formation of cells and of crystals. Meanwhile, however, the points of resemblance between them should not be overlooked. They agree in this important point, that solid bodies of a certain regular shape are formed in obedience to definite laws at the expense of a substance contained in solution in a fluid; and the crystal, like the cell, is so far an active and positive agent as to cause the substances which are precipitated to be deposited on itself, and nowhere else. We must, therefore, attribute to it as well as to the cell a power to attract the substance held in solution in the surrounding fluid. It does not indeed follow that these two

attractive powers, the power of crystallization—to give it a brief title—and the plastic power of the cells are essentially the same. This could only be admitted, if it were proved that both powers acted according to the same laws. But this is seen at the first glance to be by no means the case: the phenomena in the formation of cells and crystals, are, as we have observed, very different, even if we regard merely the plastic phenomena of the cells, and leave their metabolic power (which may possibly arise from some other peculiarity of organic substance) for a time entirely out of the question.

Is it, however, possible that these distinctions are only secondary, that the power of crystallization and the plastic power of the cells are identical, and that an original difference can be demonstrated between the substance of cells and that of crystals, by which we may perceive that the substance of cells must crystallize as cells according to the laws by which crystals are formed, rather than in the shape of the ordinary crystals? It may be worth while to institute such an inquiry.

In seeking such a distinction between the substance of cells and that of crystals, we may say at once that it cannot consist in anything which the substance of cells has in common with those organic substances which crystallize in the ordinary form. Accordingly, the more complicated arrangement of the atoms of the second order in organic bodies cannot give rise to this difference; for we see in sugar, for instance, that the mode of crystallization is not altered by this chemical composition.

Another point of difference by which inorganic bodies are distinguished from at least some of the organic bodies, is the faculty of imbibition. Most organic bodies are capable of being infiltrated by water, and in such a manner that it penetrates not so much into the interspaces between the elementary tissues of the body, as into the simple structureless tissues, such as areolar tissue, &c.; so that they form an homogeneous mixture, and we can neither distinguish particles of organic matter, nor interspaces filled with water. The water occupies the infiltrated organic substances, just as it is present in a solution, and there is as much difference between the capacity for imbibition and capillary permeation, as there is between a solution and the phenomena of capillary permeation. When water soaks through a layer of glue, we do not imagine it to pass through pores, in the common sense of the term; and this is just the condition of all substances capable of imbibition. They possess, therefore, a double nature, they have a definite form

like solid bodies; but like fluids, on the other hand, they are also permeable by anything held in solution. As a specifically lighter fluid poured on one specifically heavier so carefully as not to mix with it, yet gradually penetrates it, so also, every solution, when brought into contact with a membrane already infiltrated with water, bears the same relations to the membrane, as though it were a solution. And crystallization being the transition from the fluid to the solid state, we may conceive it possible, or even probable, that if bodies, capable of existing in an intermediate state beteween solid and fluid could be made to crystallize, a considerable difference would be exhibited from the ordinary mode of crystallization. In fact, there is nothing, which we call a crystal, composed of substance capable of imbibition; and even among organized substances, crystallization takes place only in those which are capable of imbibition, as fat, sugar, tartaric acid, &c. The bodies capable of imbibition, therefore, either do not crystallize at all, or they do so under a form so different from the crystal that they are not recognized as such.

Let us inquire what would most probably ensue, if material capable of imbibition crystallized according to the ordinary laws, what varieties from the common crystals would be most likely to show themselves, assuming only that the solution has permeated through the parts of the crystal already formed, and that new molecules can therefore be deposited between them. The ordinary crystals increase only by apposition; but there may be an important difference in the mode of this apposition. If the molecules were all deposited symmetrically one upon another, we might indeed have a body of a certain external form like a crystal; but it would not have the structure of one, it would not consist of layers. The existence of this laminated structure in crystals presupposes a double kind of apposition of their molecules; for in each layer the newly-deposited molecules coalesce, and become continuous with those of the same layer already present; but those molecules which form the adjacent surfaces of two layers do not coalesce. This is a remarkable peculiarity in the formation of crystals, and we are quite ignorant of its cause. We cannot yet perceive why the new molecules, which are being deposited on the surface of a crystal (already formed up to a certain point), do not coalesce and become continuous with those already deposited, like the molecules in each separate layer, instead of forming, as they do, a new layer; and why this new layer does not constantly increase in thickness, instead of producing a second layer around the

crystal, and so on. In the meantime we can do no more than express the fact in the form of a law, that the coalescing molecules are deposited rather along the surface beside each other, than in the thickness upon one another, and thus, as the breadth of the layer depends upon the size of the crystal, so also the layer can attain only a certain thickness, and beyond this, the molecules which are being deposited cannot coalesce with it, but must form a new layer.

If we now assume that bodies capable of imbibition could also crystallize, the two modes of junction of the molecules should be shown also by them. Their structure should also be laminated, at least there is no perceptible reason for a difference in this particular, as the very fact of layers being formed in common crystals shows that the molecules need not be all joined together in the most exact manner possible. The closest possible conjunction of the molecules takes place only in the separate layers. In the common crystals this occurs by apposition of the new molecules on the surface of those present and coalescence with them. In bodies capable of imbibition, a much closer union is possible, because in them the new molecules may be deposited by intussusception between those already present. It is scarcely, therefore, too bold an hypothesis to assume, that when bodies capable of imbibition crystallize, their separate layers would increase by intussusception; and that this does not happen in ordinary crystals, simply because it is impossible.

Let us then imagine a portion of the crystal to be formed: new molecules continue to be deposited, but do not coalesce with the portion of the crystal already formed; they unite with one another only, and form a new layer, which, according to analogy with the common crystals, may invest either the whole or a part of the crystal. We will assume that it invests the entire crystal. Now, although this layer be formed by the deposition of new molecules between those already present instead of by apposition, yet this does not involve any change in the law, in obedience to which the deposition of the coalescing molecules goes on more vigorously in two directions, that is, along the surface, than it does in the third direction corresponding to the thickness of the layer; that is to say, the molecules which are deposited by intussusception between those already present, must be deposited much more vigorously between those lying together along the surface of the layer than between those which lie over one another in its thickness. This deposition of molecules side by side is limited in common crystals by the size of the crystal, or by that of the surface on which the layer is

formed; the coalescence of molecules therefore ceases as regards that layer, and a new one begins. But if the layers grow by intussusception in crystals capable of imbibition, there is nothing to prevent the deposition of more molecules between those which lie side by side upon the surface, even after the lamina has invested the whole crystal; it may continue to grow without the law by which the new molecules coalesce requiring to be altered. But the consequence is, that the layer becomes, in the first instance more condensed, that is, more solid substance is taken into the same space; and afterwards it will expand and separate from the completed part of the crystal so as to leave a hollow space between itself and the crystal; this space fills with fluid by imbibition, and the first-formed portion of the crystal adheres to a spot on its inner surface. Thus, in bodies capable of imbibition, instead of a new layer attached to the part of the crystal already formed, we obtain a hollow vesicle. At first this must have the shape of the body of the crystal around which it is formed, and must, therefore, be angular, if the crystal is angular. If, however, we imagine this layer to be composed of soft substance capable of imbibition, we may readily comprehend how such a vesicle must very soon become round or oval. But the first formed part of the crystal also consists of substance capable of imbibition, so that it is very doubtful whether it must have an angular form at all. In common crystals atoms of some one particular substance are deposited together, and we can understand how a certain angular form of the crystal may result if these atoms have a certain form, or if in certain axes they attract each other differently. But in bodies capable of imbibition, an atom of one substance is not set upon another atom of the same substance, but atoms of water come between; atoms of water, which are not united with an atom of solid substance, so as to form a compound atom, as in the water of crystallization, but which exist in some other unknown manner between the atoms of solid substance. It is not possible, therefore, to determine whether that part of the crystal which is first formed must have an angular figure or not.

An ordinary crystal consists of a number of laminæ; when so small as to be but just discernible, it has the form which the whole crystal afterwards exhibits, at least as far as regards the angles; we must therefore suppose that the first layer is formed around a very small corpuscle, which is of the same shape as the subsequent crystal. We will call this the primitive corpuscle. It is doubtful what may be the shape of this corpuscle in the crystals which are capable of imbibi-

tion. The first layer, then, is formed around the corpuscle in the way mentioned; it grows by intussusception, and thus forms a hollow, round or oval vesicle, to the inner surface of which the primitive corpuscle adheres. As all the new molecules that are being deposited may be placed in this layer without any alteration being required in the law which regulates the coalescence of the molecules during crystallization, we must conclude that it remains the only layer, and becomes greatly expanded, so as to represent all the layers of an ordinary crystal. It is, however, a question whether there may not exist some reasons why several layers can be formed. We can certainly conceive such to be the case. The quantity of the solid substance that must crystallize in a given time, depends upon the concentration of the fluid; the number of molecules that may, in accordance with the law already mentioned, be deposited in the layer in a given time depends upon the quantity of the solution which can penetrate the membrane by imbibition during that time. If in consequence of the concentration of the fluid there must be more precipitated in the time than can penetrate the membrane, it can only be deposited as a new layer on the outer surface of the vesicle. When this second layer is formed, the new molecules are deposited in it, and it rapidly becomes expanded into a vesicle, on the inner surface of which the first vesicle lies with its primitive corpuscle. The first vesicle now either does not grow at all, or at any rate much more slowly, and then only when the endosmosis into the cavity of the second vesicle proceeds so rapidly that all that might be precipitated while passing through it, is not deposited. The second vesicle, when it is developed at all, must needs be developed relatively with more rapidity than the first; for as the solution is in the most concentrated state at the beginning, the necessity for the formation of a second layer then occurs sooner; but when it is formed, the concentration of the fluid is diminished, and this necessity occurs either later or not at all. It is possible, however, that even a third, or fourth, and more, may be formed; but the outermost layer must always be relatively the most vigorously developed; for when the concentration of the solution is only so strong, that all that must be deposited in a certain time, can be deposited in the outermost layer, it is all applied to the increase of this layer.

Such, then, would be the phenomena under which substances capable of imbibition would probably crystallize, if they did so at all. I say probably, for our incomplete knowledge of crystallization and the faculty of imbibition, does not as yet admit of our saying anything

positively *a priori*. It is, however, obvious that these are the principal phenomena attending the formation of cells. They consist always of substance capable of imbibition; the first part formed is a small corpuscle, not angular (nucleolus), around this a lamina is deposited (nucleus), which advances rapidly in its growth, until a second lamina (cell) is formed around it. This second now grows more quickly and expands into a vesicle, as indeed often happens with the first layer. In some rarer instances only one layer is formed; in others, again, there are three. The only other difference in the formation of cells is, that the separate layers do not consist of the same chemical substance, while a common crystal is always composed of one material. In instituting a comparison, therefore, between the formation of cells and crystallization, the above-mentioned differences in form, structure, and mode of growth fall altogether to the ground. If crystals were formed from the same substance as cells, they would probably, in these respects, be subject to the same conditions as the cells. Meanwhile the metabolic phenomena, which are entirely absent in crystals, still indicate essential distinctions.

Should this important difference between the mode of formation of cells and crystals lead us to deny all intimate connexion of the two processes, the comparison of the two may serve at least to give a clear representation of the cell-life. The following may be conceived to be the state of the matter: the material of which the cells are composed is capable of producing chemical changes in the substance with which it is in contact, just as the well-known preparation of platinum converts alcohol into acetic acid. This power is possessed by every part of the cell. Now, if the cytoblastema be so changed by a cell already formed, that a substance is produced which cannot become attached to that cell, it immediately crystallizes as the central nucleolus of a new cell. And then this converts the cytoblastema in the same manner. A portion of that which is converted may remain in the cytoblastema in solution, or may crystallize as the commencement of new cells; another portion, the cell-substance, crystallizes around the central corpuscle. The cell-substance is either soluble in the cytoblastema, and crystallizes from it, so soon as the latter becomes saturated with it; or else it is insoluble, and crystallizes at the time of its formation, according to the laws of crystallization of bodies capable of imbibition mentioned above, forming in this manner one or more layers around the central corpuscle, and so on. If we conceive the above to represent the mode of formation of cells, we

regard the plastic power of the cells as identical with the power by which crystals grow. According to the foregoing description of the crystallization of bodies capable of imbibition, the most important plastic phenomena of the cells are certainly satisfactorily explained. But let us see if this comparison agrees with all the characteristics of the plastic power of the cells.

The attractive power of the cells does not always operate symmetrically; the deposition of new molecules may be more vigorous in particular spots, and thus produce a change in the form of the cell. This is quite analogous to what happens in crystals; for although in them an angle is never altered, there may be much more material deposited on some surfaces than on others; and thus, for instance, a quadrilateral prism may be formed out of a cube. In this case new layers are deposited on one, or on two opposite sides of a cube. Now, if one layer in cells represent a number of layers in a common crystal, it may be easily perceived that instead of several new layers being formed on two opposite surfaces of a cell, the one layer would grow more at those spots, and thus a round cell would be elongated into a fibre; and so with the other changes of form. Division of the cells can have no analogue in common crystals, because that which is once deposited is incapable of any further change. But this phenomenon may be made to accord with the representation of crystals capable of imbibition, just as well as the coalescence of numerous cells in the manner described at page 184 does. And if we ascribe to a layer of a crystal capable of imbibition the power of producing chemical changes in organic substances, we can very well understand also the origin of secondary deposits on its inner surface as they occur in cells. For if, in accordance with the laws of crystallization, the lamina has become expanded into a vesicle, and its cavity has become filled by imbibition with a solution of organic substance, there may be materials formed by means of the converting influence of the lamina, which cannot any longer be held in solution. These may, then, either crystallize within the vesicle, as new crystals capable of imbibition under the form of cells; or if they are allied to the substance of the vesicle, they may so crystallize as to form part of the system of the vesicle itself: the latter may occur in two ways, the new matters may be applied to the increase of the vesicle, or they may form new layers on its inner surface from the same cause which led to the first formation of the vesicle itself as a layer. In the cells of plants these secondary deposits have a spiral arrangement. This is a very important fact, though the

laws of crystallization do not seem to account for the absolute necessity of it. If, however, it could be mathematically proved from the laws of the crystallization of inorganic bodies, that under the altered circumstances in which bodies capable of imbibition are placed, these deposits must be arranged in spiral forms, it might be asserted without hesitation that the plastic power of cells and the fundamental powers of crystals are identical.

We come now, however, to some peculiarities in the plastic power of cells, to which we might, at first sight, scarcely expect to find anything analogous in crystals. The attractive power of the cells manifests a certain degree of election in its operation; it does not attract every substance present in the cytoblastema, but only particular ones; and here a muscle-cell, there a fat-cell, is generated from the same fluid, the blood. Yet crystals afford us an example of a precisely similar phenomenon, and one which has already been frequently adduced as analogous to assimilation. If a crystal of nitre be placed in a solution of nitre and sulphate of soda, only the nitre crystallizes; when a crystal of sulphate of soda is put in, only the sulphate of soda crystallizes. Here, therefore, there occurs just the same selection of the substance to be attracted.

We observed another law attending the development of the plastic phenomena in the cells, viz. that a more concentrated solution is requisite for the first formation of a cell than for its growth when already formed, a law upon which the difference between organized and unorganized tissues is based. In ordinary crystallization the solution must be more than saturated for the process to begin. But when it is over, there remains a mother lye, according to Thénard, which is no longer saturated at the same temperature. This phenomenon accords precisely with the cells; it shows that a more concentrated solution is requisite for the commencement of crystallization than for the increase of a crystal already formed. The fact has indeed been disputed by Thomson; but if, in the undisputed experiment quoted above, the crystal of sulphate of soda attracts the dissolved sulphate of soda rather than the dissolved nitre, and *vice versa,* the crystal of nitre attracts the dissolved nitre more than the dissolved sulphate of soda, it follows that a crystal does attract a salt held in solution, because the experiment proves that there are degrees of this attraction. But if there be such an attraction exerted by a crystal, then the introduction of a crystal into a solution of a salt, affords an efficient cause for the deposition of this salt, which does not exist when no crystal is introduced. The solution must therefore be

more concentrated in the latter case than in the former, though the difference be so slight as not to be demonstrable by experiment. It would not, however, be superfluous to repeat the experiments. In the instance of crystals capable of imbibition, this difference may be considerably augmented, since the attraction of molecules may increase perhaps considerably by the penetrating of the solution between those already deposited.

We see then how all the plastic phenomena in the cells may be compared with phenomena which, in accordance with the ordinary laws of crystallization, would probably appear if bodies capable of imbibition could be brought to crystallize. So long as the object of such a comparison were merely to render the representation of the process by which cells are formed more clear, there could not be much urged against it; it involves nothing hypothetical, since it contains no explanation; no assertion is made that the fundamental power of the cells really has something in common with the power by which crystals are formed. We have, indeed, compared the growth of organisms with crystallization, in so far as in both cases solid substances are deposited from a fluid, but we have not therefore asserted the identity of the fundamental powers. So far we have not advanced beyond the data, beyond a certain simple mode of representing the facts.

The question is, however, whether the exact accordance of the phenomena would not authorize us to go further. If the formation and growth of the elementary particles of organisms have nothing more in common with crystallization than merely the deposition of solid substances from out of a fluid, there is certainly no reason for assuming any more intimate connexion of the two processes. But we have seen, first, that the laws which regulate the deposition of the molecules forming the elementary particles of organisms are the same for all elementary parts; that there is a common principle in the development of all elementary parts, namely, that of the formation of cells; it was then shown that the power which induced the attachment of the new molecules did not reside in the entire organism, but in the separate elementary particles (this we called the plastic power of the cells); lastly, it was shown that the laws, according to which the new molecules combine to form cells, are (so far as our incomplete knowledge of the laws of crystallization admits of our anticipating their probability) the same as those by which substances capable of imbibition would crystallize. Now the cells do, in fact, consist only of material capable of imbibition; should

we not then be justified in putting forth the proposition, that the formation of the elementary parts of organisms is nothing but a crystallization of substance, capable of imbibition, and the organism nothing but an aggregate of such crystals capable of imbibition?

To advance so important a point as absolutely true, would certainly need the clearest proof; but it cannot be said that even the premises which have been set forth have in all points the requisite force. For too little is still known of the cause of crystallization to predict with safety (as was attempted above) what would follow if a substance capable of imbibition were to crystallize. And if these premises were allowed, there are two other points which must be proved in order to establish the proposition in question: 1. That the metabolic phenomena of the cells, which have not been referred to in the foregoing argument, are as much the necessary consequence of the faculty of imbibition, or of some other peculiarity of the substance of cells, as the plastic phenomena are. 2. That if a number of crystals capable of imbibition are formed, they must combine according to certain laws so as to form a systematic whole, similar to an organism. Both these points must be clearly proved, in order to establish the truth of the foregoing view. But it is otherwise if this view be adduced merely as an hypothesis, which may serve as a guide for new investigations. In such case the inferences are sufficiently probable to justify such an hypothesis, if only the two points just mentioned can be shown to accord with it.

With reference to the first of these points, it would certainly be impossible, in our ignorance as to the cause of chemical phenomena in general, to prove that a crystal capable of imbibition must produce chemical changes in substances surrounding it; but then we could not infer, from the manner in which spongy platinum is formed, that it would act so peculiarly upon oxygen and hydrogen. But in order to render this view tenable as a possible hypothesis, it is only necessary to see that it may be a consequence. It cannot be denied that it may: there are several reasons for it, though they certainly are but weak. For instance, since all cells possess this metabolic power, it is more likely to depend on a certain position of the molecules, which in all probability is essentially the same in all cells, than on the chemical combination of the molecules, which is very different in different cells. The presence, too, of different substances on the inner and the outer surface of the cell-membrane (see above, page 199) in some measure implies that a certain direction of the axes of the atoms may be essential to the metabolic phe-

nomena of the cells. I think, therefore, that the cause of the metabolic phenomena resides in that definite mode of arrangement of the molecules which occurs in crystals, combined with the capacity which the solution has to penetrate between these regularly deposited molecules (by means of which, presuming the molecules to possess polarity, a sort of galvanic pile will be formed), and that the same phenomena would be observed in an ordinary crystal, if it could be rendered capable of imbibition. And then perhaps the differences of quality in the metabolic phenomena depend upon their chemical composition.

In order to render tenable the hypothesis contained in the second point, it is merely necessary to show that crystals capable of imbibition can unite with one another according to certain laws. If at their first formation all crystals were isolated, if they held no relation whatever to each other, the view would leave entirely unexplained how the elementary parts of organisms, that is, the crystals in question, become united to form a whole. It is therefore necessary to show that crystals do unite with each other according to certain laws, in order to perceive, at least, the possibility of their uniting also to form an organism, without the need of any further combining power. But there are many crystals in which a union of this kind, according to certain laws, is indisputable; indeed they often form a whole, so like an organism in its entire form, that groups of crystals are known in common life by the names of flowers, trees, etc. I need only refer to the ice-flowers on the windows, or to the lead-tree, etc. In such instances a number of crystals arrange themselves in groups around others, which form an axis. If we consider the contact of each crystal with the surrounding fluid to be an indispensable condition to the growth of crystals which are not capable of imbibition, but that those which are capable of imbibition, in which the solution can penetrate whole layers of crystals, do not require this condition, we perceive that the similarity between organisms and these aggregations of crystals is as great as could be expected with such difference of substance. As most cells require for the production of their metabolic phenomena, not only their peculiar nutrient fluid, but also the access of oxygen and the power of exhaling carbonic acid, or *vice versa;* so, on the other hand, organisms in which there is no circulation of respiratory fluid, or in which at least it is not sufficient, must be developed in such a way as to present as extensive a surface as possible to the atmospheric air. This is the condition of plants, which require for their growth that the individual cells should come into contact with the

surrounding medium in a similar manner, if not in the same degree as occurs in a crystal tree, and in them indeed the cells unite into a whole organism in a form much resembling a crystal tree. But in animals the circulation renders the contact of the individual cells with the surrounding medium superfluous, and they may have more compact forms, even though the laws by which the cells arrange themselves are essentially the same.

The view then that organisms are nothing but the form under which substances capable of imbibition crystalize, appears to be compatible with the most important phenomena of organic life, and may be so far admitted, that it is a possible hypothesis; or attempt towards an explanation of these phenomena. It involves very much that is uncertain and paradoxical, but I have developed it in detail, because it may serve as a guide for new investigations. For even if no relation between crystallization and the growth of organisms be admitted in principle, this view has the advantage of affording a distinct representation of the organic processes; an indispensable requisite for the institution of new inquiries in a systematic manner, or for testing by the discovery of new facts a mode of explanation which harmonizes with phenomena already known.

HERBERT SPENCER

HERBERT SPENCER was born at Derby, England, Apr. 27, 1820. His father was a teacher, and Herbert was at first educated at home, then by an uncle. He was much interested in science, but would not go to college, and in 1837 became a civil engineer. He soon began writing engineering articles for "The Civil Engineer" and social articles for "The Nonconformist." The engineering profession was overcrowded and he gave it up and got a place on "The Economist" in London.

From 1850 to 1860 he published many articles developing his doctrine of a gradual evolution from homogeneity to heterogeneity. He was one of the first to accept Darwin's theory of the origin of species.

After 1860 he occupied himself in developing a complete synthetic

philosophy tracing the laws of evolution in all branches of knowledge. His work has given a great impetus to social studies and in this field at least he may be classed as a positivist.

PROGRESS: ITS LAW AND CAUSE

[*First published in* The Westminster Review *for April,* 1857. *Though the ideas and illustrations contained in this essay were eventually incorporated in* First Principles, *yet I think it well here to reproduce it as exhibiting the form under which the General Doctrine of Evolution made its first appearance.*]

The current conception of progress is shifting and indefinite. Sometimes it comprehends little more than simple growth—as of a nation in the number of its members and the extent of territory over which it spreads. Sometimes it has reference to quantity of material products—as when the advance of agriculture and manufactures is the topic. Sometimes the superior quality of these products is contemplated; and sometimes the new or improved appliances by which they are produced. When, again, we speak of moral or intellectual progress, we refer to states of the individual or people exhibiting it; while, when the progress of Science or Art is commented upon, we have in view certain abstract results of human thought and action. Not only, however, is the current conception of progress more or less vague, but it is in great measure erroneous. It takes in not so much the reality of progress as its accompaniments—not so much the substance as the shadow. That progress in intelligence seen during the growth of the child into the man, or the savage into the philosopher, is commonly regarded as consisting in the greater number of facts known and laws understood; whereas the actual progress consists in those internal modifications of which this larger knowledge is the expression. Social progress is supposed to consist in the making of a greater quantity and variety of the articles required for satisfying men's wants; in the increasing security of person and property; in widening freedom of action; whereas, rightly understood, social progress consists in those changes of structure in the social organism which have entailed these consequences. The current conception is a teleological one. The phenomena are contemplated solely as bearing on human happiness. Only those changes are held to constitute progress which directly or indirectly tend to heighten human happiness; and they are thought to constitute progress simply because they tend to heighten

human happiness. But rightly to understand progress, we must learn the nature of these changes, considered apart from our interests. Ceasing, for example, to regard the successive geological modifications that have taken place in the earth, as modifications that have gradually fitted it for the habitation of man, and as therefore constituting geological progress, we must ascertain the character common to these modifications—the law to which they all conform. And similarly in every other case. Leaving out of sight concomitants and beneficial consequences, let us ask what progress is in itself.

In respect to that progress which individual organisms display in the course of their evolution, this question has been answered by the Germans. The investigations of Wolff, Goethe, and von Baer, have established the truth that the series of changes gone through during the development of a seed into a tree, or an ovum into an animal, constitute an advance from homogeneity of structure to heterogeneity of structure. In its primary stage, every germ consists of a substance that is uniform throughout, both in texture and chemical composition. The first step is the appearance of a difference between two parts of this substance; or, as the phenomenon is called in physiological language, a differentiation. Each of these differentiated divisions presently begins itself to exhibit some contrast of parts; and by and by these secondary differentiations become as definite as the original one. This process is continuously repeated—is simultaneously going on in all parts of the growing embryo; and by endless such differentiations there is finally produced that complex combination of tissues and organs constituting the adult animal or plant. This is the history of all organisms whatever. It is settled beyond dispute that organic progress consists in a change from the homogeneous to the heterogeneous.

Now, we propose in the first place to show that this law of organic progress is the law of all progress. Whether it be in the development of the earth, in the development of life upon its surface, in the development of society, of government, of manufactures, of commerce, of language, literature, science, art, this same evolution of the simple into the complex, through successive differentiations, holds throughout. From the earliest traceable cosmical changes down to the latest results of civilization we shall find that the transformation of the homogeneous into the heterogeneous is that in which progress essentially consists.

With the view of showing that if the nebular hypothesis be true, the genesis of the solar system supplies one illustration of this law, let

us assume that the matter of which the sun and planets consist was once in a diffused form; and that from the gravitation of its atoms there resulted a gradual concentration. By the hypothesis, the solar system in its nascent state existed as an indefinitely extended and nearly homogeneous medium—a medium almost homogeneous in density, in temperature, and in other physical attributes. The first change in the direction of increased aggregation brought a contrast in density and a contrast in temperature between the interior and the exterior of this mass. Simultaneously the drawing in of outer parts caused motions ending in rotation round a centre with various angular velocities. These differentiations increased in number and degree until there was evolved the organized group of sun, planets, and satellites, which we now know—a group which presents numerous contrasts of structure and action among its members. These are the immense contrasts between the sun and the planets, in bulk and and in weight; as well as the subordinate contrasts between one planet and another, and between the planets and their satellites. There is the similarly-marked contrast between the sun as almost stationary (relatively to the other members of the solar system), and the planets as moving round him with great velocity: while there are the secondary contrasts between the velocities and periods of the several planets, and between their simple revolutions and the double ones of their satellites, which have to move round their primaries while moving round the sun. There is the yet further strong contrast between the sun and the planets in respect of temperature; and there is good reason to suppose that the planets and satellites differ from each other in their proper heats, as well as in the amounts of heat they receive from the sun. When we bear in mind that, in addition to these various contrasts, the planets and the satellites also differ in respect to their distances from each other and their primary; in respect to the inclinations of their orbits, the inclinations of their axes, their times of rotation on their axes, their specific gravities, and their physical constitutions; we see what a high degree of heterogeneity the solar system exhibits, when compared with the almost complete homogeneity of the nebulous mass out of which it is supposed to have originated.

Passing from this hypothetical illustration, which must be taken for what it is worth, without prejudice to the general argument, let us descend to a more certain order of evidence. It is now generally agreed among geologists and physicists that the earth was at one time a mass of molten matter. If so, it was at that time relatively homogeneous in

consistence, and, in virtue of the circulation which takes place in heated fluids, must have been comparatively homogeneous in temperature; and it must have been surrounded by an atmosphere consisting partly of the elements of air and water, and partly of those various other elements which are among the more ready to assume gaseous forms at high temperatures. That slow cooling by radiation, which is still going on at an inappreciable rate, and which, though originally far more rapid than now, necessarily required an immense time to produce any decided change, must ultimately have resulted in the solidification of the portion most able to part with its heat—namely, the surface. In the thin crust thus formed we have the first marked differentiation. A still further cooling, a consequent thickening of this crust, and an accompanying deposition of all solidifiable elements contained in the atmosphere, must finally have been followed by the condensation of the water previously existing as vapour. A second marked differentiation must thus have arisen; and as the condensation must have taken place on the coolest parts of the surface—namely, about the poles—there must thus have resulted the first geographical distinction of parts. To these illustrations of growing heterogeneity, which, though deduced from known physical laws, may be regarded as more or less hypothetical, geology adds an extensive series that have been inductively established. Investigations show that the earth has been continually becoming more heterogeneous in virtue of the multiplication of sedimentary strata which form its crust; also, that it has been becoming more heterogeneous in respect of the composition of these strata, the later of which, being made from the detritus of the earlier, are many of them rendered highly complex by the mixture of materials they contain; and further, that this heterogeneity has been vastly increased by the actions of the earth's still molten nucleus upon its envelope, whence have resulted not only many kinds of igneous rocks, but the tilting up of sedimentary strata at all angles, the formation of faults and metallic veins, the production of endless dislocations and irregularities. Yet, again, geologists teach us that the earth's surface has been growing more varied in elevation—that the most ancient mountain systems are the smallest, and the Andes and Himalayas the most modern; while in all probability there have been corresponding changes in the bed of the ocean. As a consequence of these ceaseless differentiations, we now find that no considerable portion of the earth's exposed surface is like any other portion, either in contour, in geologic structure, or in chemical composition; and that in

most parts it changes from mile to mile in all these characters. Moreover, there has been simultaneously going on a differentiation of climates. As fast as the earth cooled and its crust solidified, there arose appreciable differences in temperature between those parts of its surface more exposed to the sun and those less exposed. As the cooling progressed, these differences became more pronounced; until there finally resulted those marked contrasts between regions of perpetual ice and snow, regions where winter and summer alternately reign for periods varying according to the latitude, and regions where summer follows summer with scarcely an appreciable variation. At the same time the many and varied elevations and subsidences of portions of the earth's crust, bringing about the present irregular distribution of land and sea, have entailed modifications of climate beyond those dependent on latitude; while a yet further series of such modifications have been produced by increasing differences of elevation in the land, which have in sundry places brought arctic, temperate, and tropical climates to within a few miles of one another. And the general outcome of these changes is, that not only has every extensive region its own meteorologic conditions, but that every locality in each region differs more or less from others in those conditions; as in its structure, its contour, its soil. Thus, between our existing earth, the phenomena of whose crust neither geographers, geologists, mineralogists, nor meteorologists have yet enumerated, and the molten globe out of which it was evolved, the contrast in heterogeneity is extreme.

When from the earth itself we turn to the plants and animals which have lived, or still live, upon its surface, we find ourselves in some difficulty from lack of facts. That every existing organism has been developed out of the simple into the complex, is indeed the first established truth of all; and that every organism which existed in past times was similarly developed, is an inference no physiologist will hesitate to draw. But when we pass from individual forms of life to life in general, and inquire whether the same law is seen in the *ensemble* of its manifestations—whether modern plants and animals are of more heterogeneous structure than ancient ones, and whether the earth's present *flora* and *fauna* are more heterogeneous than the *flora* and *fauna* of the past—we find the evidence so fragmentary that every conclusion is open to dispute. Three-fifths of the earth's surface being covered by water; a great part of the exposed land being inaccessible to or untraveled by the geologists; the greater part of the remainder having been scarcely

more than glanced at; and even the most familiar portions, as England, having been so imperfectly explored that a new series of strata has been added within these four years—it is impossible for us to say with certainty what creatures have and what have not existed at any particular period. Considering the perishable nature of many of the lower organic forms, the metamorphosis of numerous sedimentary strata, and the great gaps occurring among the rest, we shall see further reason for distrusting our deductions. On the one hand, the repeated discovery of vertebrate remains in strata previously supposed to contain none—of reptiles where only fish were thought to exist—of mammals where it was believed there were no creatures higher than reptiles—renders it daily more manifest how small is the value of negative evidence. On the other hand, the worthlessness of the assumption that we have discovered the earliest, or anything like the earliest, organic remains, is becoming equally clear. That the oldest known sedimentary rocks have been greatly changed by igneous action, and that still older ones have been totally transformed by it, is becoming undeniable. And the fact that sedimentary strata earlier than any we know, have been melted up, being admitted, it must also be admitted that we cannot say how far back in time this destruction of sedimentary strata has been going on. Thus the title Palæozoic, as applied to the earliest known fossiliferous strata, involves a *petitio principii;* and, for aught we know to the contrary, only the last few chapters of the earth's biological history may have come down to us. On neither side, therefore, is the evidence conclusive. Nevertheless we cannot but think that, scanty as they are, the facts, taken altogether, tend to show both that the more heterogeneous organisms have been evolved in the later geologic periods, and that life in general has been more heterogeneously manifested as time has advanced. Let us cite, in illustration, the one case of the vertebrata. The earliest known vertebrate remains are those of fishes; and fishes are the most homogeneous of the vertebrata. Later and more heterogeneous are reptiles. Later still, and more heterogeneous still, are birds and mammals. If it be said that the Palæozoic deposits, not being estuary deposits, are not likely to contain the remains of terrestrial vertebrata, which may nevertheless have existed at that era, we reply that we are merely pointing to the leading facts, such as they are. But to avoid any such criticism, let us take the mammalian subdivision only. The earliest known remains of mammals are those of small marsupials, which are the lowest of the mammalian type; while, conversely, the highest of the mammalian

type—man—is the most recent. The evidence that the vertebrate fauna, as a whole, has become more heterogeneous, is considerably stronger. To the argument that the vertebrate fauna of the Palæozoic period, consisting, so far as we know, entirely of fishes, was less heterogeneous than the modern vertebrate fauna, which includes reptiles, birds, and mammals, of multitudinous genera, it may be replied, as before, that estuary deposits of the Palæozoic period, could we find them, might contain other orders of vertebrata. But no such reply can be made to the argument that whereas the marine vertebrata of the Palæozoic period consisted entirely of cartilaginous fishes, the marine vertebrata of later periods include numerous genera of osseous fishes; and that therefore the later marine vertebrata faunas are more heterogeneous than the oldest known one. Nor, again, can any such reply be made to the fact that there are far more numerous orders and genera of mammalian remains in the tertiary formations than in the secondary formations. Did we wish merely to make out the best case, we might dwell upon the opinion of Dr. Carpenter, who says that "the general facts of Palæontology appear to sanction the belief that the same plan may be traced out in what may be called the general life of the globe, as in the individual life of every one of the forms of organized being which now people it." Or we might quote, as decisive, the judgment of Professor Owen, who holds that the earlier examples of each group of creatures severally departed less widely from archetypal generality than the later examples—were severally less unlike the fundamental form common to the group as a whole; and thus constituted a less heterogeneous group of creatures. But in deference to an authority for whom we have the highest respect, who considers that the evidence at present obtained does not justify a verdict either way, we are content to leave the question open.

Whether an advance from the homogeneous to the heterogeneous is or is not displayed in the biological history of the globe, it is clearly enough displayed in the progress of the latest and most heterogeneous creature—man. It is true alike that, during the period in which the earth has been peopled, the human organism has grown more heterogeneous among the civilized divisions of the species; and that the species as a whole has been growing more heterogeneous in virtue of the multiplication of races and the differentiation of these races from each other. In proof of the first of these positions we may cite the fact that, in the relative development of the limbs, the civilized man departs more widely from the general type of the placental mammalia than do the

lower human races. While often possessing well-developed body and arms, the Australian has very small legs: thus reminding us of the chimpanzee and the gorilla, which present no great contrasts in size between the hind and fore limbs. But in the European, the greater length and massiveness of the legs have become marked—the fore and hind limbs are more heterogeneous. Again, the greater ratio which the cranial bones bear to the facial bones illustrates the same truth. Among the vertebrata in general, progress is marked by an increasing heterogeneity in the vertebral column, and more especially in the segments constituting the skull: the higher forms being distinguished by the relatively larger size of the bones which cover the brain, and the relatively smaller size of those which form the jaw, etc. Now this characteristic, which is stronger in man than in any other creature, is stronger in the European than in the savage. Moreover, judging from the greater extent and variety of faculty he exhibits, we may infer that the civilized man has also a more complex or heterogeneous nervous system than the uncivilized man: and indeed the fact is in part visible in the increased ratio which his cerebrum bears to the subjacent ganglia, as well as in the wider departure from symmetry in its convolutions. If further elucidation be needed, we may find it in every nursery. The infant European has sundry marked points of resemblance to the lower human races; as in the flatness of the alæ of the nose, the depression of its bridge, the divergence and forward opening of the nostrils, the form of the lips, the absence of a frontal sinus, the width between the eyes, the smallness of the legs. Now, as the developmental process by which these traits are turned into those of the adult European, is a continuation of that change from the homogeneous to the heterogeneous displayed during the previous evolution of the embryo, which every anatomist will admit; it follows that the parallel developmental process by which the like traits of the barbarous races have been turned into those of the civilized races, has also been a continuation of the change from the homogeneous to the heterogeneous. The truth of the second position—that mankind, as a whole, have become more heterogeneous—is so obvious as scarcely to need illustration. Every work on ethnology, by its divisions and subdivisions of races, bears testimony to it. Even were we to admit the hypothesis that mankind originated from several separate stocks, it would still remain true that, as from each of these stocks there have sprung many now widely different tribes, which are proved by philological evidence to have had a common origin, the race as a whole is far less

homogeneous than it once was. Add to which, that we have, in the Anglo-Americans, an example of a new variety arising within these few generations; and that, if we may trust to the descriptions of observers, we are likely soon to have another such example in Australia.

On passing from humanity under its individual form, to humanity as socially embodied, we find the general law still more variously exemplified. The change from the homogeneous to the heterogeneous is displayed in the progress of civilization as a whole, as well as in the progress of every nation; and is still going on with increasing rapidity. As we see in existing barbarous tribes, society in its first and lowest form is a homogeneous aggregation of individuals having like powers and like functions: the only marked difference of function being that which accompanies difference of sex. Every man is warrior, hunter, fisherman, tool-maker, builder; every woman performs the same drudgeries. Very early, however, in the course of social evolution, there arises an incipient differentiation between the governing and the governed. Some kind of chieftainship seems coeval with the first advance from the state of separate wandering families to that of a nomadic tribe. The authority of the strongest or the most cunning makes itself felt among a body of savages as in a herd of animals, or a posse of schoolboys. At first, however, it is indefinite, uncertain; is shared by others of scarcely inferior power; and is unaccompanied by any difference in occupation or style of living: the first ruler kills his own game, makes his own weapons, builds his own hut, and, economically considered, does not differ from others of his tribe. Gradually, as the tribe progresses, the contrast between the governing and the governed grows more decided. Supreme power becomes hereditary in one family; the head of that family, ceasing to provide for his own wants, is served by others; and he begins to assume the sole office of ruling. At the same time there has been arising a co-ordinate species of government—that of religion. As all ancient records and traditions prove, the earliest rulers are regarded as divine personages. The maxims and commands they uttered during their lives are held sacred after their deaths, and are enforced by their divinely-descended successors; who in their turns are promoted to the pantheon of the race, here to be worshiped and propitiated along with their predecessors: the most ancient of whom is the supreme god, and the rest subordinate gods. For a long time these connate forms of government—civil and religious—remain closely associated. For many generations the king continues to be the chief priest, and the priesthood to

be members of the royal race. For many ages religious law continues to include more or less of civil regulation, and civil law to possess more or less of religious sanction; and even among the most advanced nations these two controlling agencies are by no means completely separated from each other. Having a common root with these, and gradually diverging from them, we find yet another controlling agency—that of ceremonial usages. All titles of honour are originally the names of the god-king; afterwards of the god and the king; still later of persons of high rank; and finally come, some of them, to be used between man and man. All forms of complimentary address were at first the expressions of submission from prisoners to their conqueror, or from subjects to their ruler, either human or divine—expressions which were afterwards used to propitiate subordinate authorities, and slowly descended into ordinary intercourse. All modes of salutation were once obeisances made before the monarch and used in worship of him after his death. Presently others of the god-descended race were similarly saluted; and by degrees some of the salutations have become the due of all. Thus, no sooner does the originally-homogeneous social mass differentiate into the governed and the governing parts, than this last exhibits an incipient differentiation into religious and secular—church and state; while at the same time there begins to be differentiated from both, that less definite species of government which rules our daily intercourse—a species of government which, as we may see in heralds' colleges, in books of the peerage, in masters of ceremonies, is not without a certain embodiment of its own. Each of these is itself subject to successive differentiations. In the course of ages there arises, as among ourselves, a highly complex political organization of monarch, ministers, lords and commons, with their subordinate administrative departments, courts of justice, revenue offices, etc., supplemented in the provinces by municipal governments, county governments, parish or union governments—all of them more or less elaborated. By its side there grows up a highly complex religious organization, with its various grades of officials, from archbishops down to sextons, its colleges, convocations, ecclesiastical courts, etc.; to all of which must be added the ever-multiplying independent sects, each with its general and local authorities. And at the same time there is developed a highly complex aggregation of customs, manners, and temporary fashions, enforced by society at large, and serving to control those minor transactions between man and man which are not regulated by civil and religious law. Moreover, it is to be observed

that this increasing heterogeneity in the governmental appliances of each nation has been accompanied by an increasing heterogeneity in the assemblage of governmental appliances of different nations: all nations being more or less unlike in their political systems and legislation, in their creeds and religious institutions, in their customs and ceremonial usages.

Simultaneously there has been going on a second differentiation of a more familiar kind; that, namely, by which the mass of the community has been segregated into distinct classes and orders of workers. While the governing part has undergone the complex development above detailed, the governed part has undergone an equally complex development, which has resulted in that minute division of labour characterizing advanced nations. It is needless to trace out this progress from its first stages, up through the caste divisions of the East and the incorporated guilds of Europe, to the elaborate producing and distributing organization existing among ourselves. It has been an evolution which, beginning with a tribe whose members severally perform the same actions each for himself, ends with a civilized community whose members severally perform different actions for each other; and an evolution which has transformed the solitary producer of any one commodity into a combination of producers who, united under a master, take separate parts in the manufacture of such commodity. But there are yet other and higher phases of this advance from the homogeneous to the heterogeneous in the industrial organization of society. Long after considerable progress has been made in the division of labour among different classes of workers, there is still little or no division of labour among the widely separated parts of the community: the nation continues comparatively homogeneous in the respect that in each district the same occupations are pursued. But when roads and other means of transit become numerous and good, the different districts begin to assume different functions, and to become mutually dependent. The calico manufacture locates itself in this county, the woolen cloth manufacture in that; silks are produced here, lace there; stockings in one place, shoes in another; pottery, hardware, cutlery, come to have their special towns; and ultimately every locality becomes more or less distinguished from the rest by the leading occupation carried on in it. This subdivision of functions show itself not only among the different parts of the same nation, but among different nations. That exchange of commodities which free trade is increasing so largely, will ultimately have the effect

of specializing, in a greater or less degree, the industry of each people. So that, beginning with a barbarous tribe, almost if not quite homogeneous in the functions of its members, the progress has been, and still is, towards an economic aggregation of the whole human race; growing ever more heterogeneous in respect of the separate functions assumed by separate nations, the separate functions assumed by the local sections of each nation, the separate functions assumed by the many kinds of makers and traders in each town, and the separate functions assumed by the workers united in producing each commodity.

The law thus clearly exemplified in the evolution of the social organism is exemplified with equal clearness in the evolution of all products of human thought and action; whether concrete or abstract, real or ideal. Let us take language as our first illustration.

The lowest form of language is the exclamation, by which an entire idea is vaguely conveyed through a single sound, as among the lower animals. That human language ever consisted solely of exclamations, and so was strictly homogeneous in respect of its parts of speech, we have no evidence. But that language can be traced down to a form in which nouns and verbs are its only elements, is an established fact. In the gradual multiplication of parts of speech out of these primary ones—in the differentiation of verbs into active and passive, of nouns into abstract and concrete—in the rise of distinctions of mood, tense, person, of number and case—in the formation of auxiliary verbs, of adjectives, adverbs, pronouns, prepositions, articles—in the divergence of those orders, genera, species, and varieties of parts of speech by which civilized races express minute modifications of meaning—we see a change from the homogeneous to the heterogeneous. Another aspect under which we may trace the development of language is the divergence of words having common origins. Philology early disclosed the truth that in all languages words may be grouped into families, the members of each of which are allied by their derivation. Names springing from a primitive root, themselves become the parents of other names still further modified. And by the aid of those systematic modes which presently arise, of making derivatives and forming compound terms, there is finally developed a tribe of words so heterogeneous in sound and meaning that to the uninitiated it seems incredible they should be nearly related. Meanwhile from other roots there are being evolved other such tribes, until there results a language of some sixty thousand

or more unlike words, signifying as many unlike objects, qualities, acts. Yet another way in which language in general advances from the homogeneous to the heterogeneous is in the multiplication of languages. Whether all languages have grown from one stock, or whether, as some philologists think, they have grown from two or more stocks, it is clear that since large groups of languages, as the Indo-European, are of one parentage, they have become distinct through a process of continuous divergence. The same diffusion over the earth's surface which has led to differentiations of race, has simultaneously led to differentiations of speech: a truth which we see further illustrated in each nation by the distinct dialects found in separate districts. Thus the progress of language conforms to the general law, alike in the evolution of languages, in the evolution of families of words, and in the evolution of parts of speech.

On passing from spoken to written language we come upon several classes of facts having similar implications. Written language is connate with painting and sculpture; and at first all three are appendages of architecture and have a direct connection with the primary form of all government—the theocratic. Merely noting by the way the fact that sundry wild races, as for example the Australians and the tribes of South Africa, are given to depicting personages and events upon the walls of caves, which are probably regarded as sacred places, let us pass to the case of the Egyptians. Among them, as also among the Assyrians, we find mural paintings used to decorate the temple of the god and the palace of the king (which were, indeed, originally identical); and as such they were governmental appliances in the same sense as state pageants and religious feasts were. They were governmental appliances in another way: representing as they did the worship of the god, the triumphs of the god-king, the submission of his subjects, and the punishment of the rebellious. Further, they were governmental, as being the products of an art reverenced by the people as a sacred mystery. From the habitual use of this pictorial representation there grew up the but slightly modified practice of picture-writing—a practice which was found still extant among North American peoples at the time they were discovered. By abbreviations analogous to those still going on in our own written language, the most frequently recurring of these pictured figures were successively simplified; and ultimately there grew up a system of symbols, most of which had but distant resemblances to the things for which they stood. The inference that the hieroglyphics of the

Egyptians were thus produced is confirmed by the fact that the picture-writing of the Mexicans was found to have given birth to a like family of ideographic forms; and among them, as among the Egyptians, these had been partially differentiated into the kuriological or imitative, and the tropical or symbolic; which were, however, used together in the same record. In Egypt, written language underwent a further differentiation, whence resulted the hieratic and the epistolographic or enchorial; both of which are derived from the original hieroglyphic. At the same time we find that for the expression of proper names, which could not be otherwise conveyed, signs having phonetic values were employed; and though it is alleged that the Egyptians never achieved complete alphabetic writing, yet it can scarcely be doubted that these phonetic symbols, occasionally used in aid of their ideographic ones, were the germs of an alphabetic system. Once having become separate from hieroglyphics, alphabetic writing itself underwent numerous differentiations—multiplied alphabets were produced; between most of which, however, more or less connection can still be traced. And in each civilized nation there has now grown up, for the representation of one set of sounds, several sets of written signs used for distinct purposes. Finally, from writing diverged printing; which, uniform in kind as it was at first, has since been multiform.

While written language was passing through its first stages of development, the mural decoration which contained its root was being differentiated into painting and sculpture. The gods, kings, men, and animals represented, were originally marked by indented outlines and coloured. In most cases these outlines were of such depth, and the object they circumscribed so far rounded and marked out in its leading parts, as to form a species of work intermediate between intaglio and bas-relief. In other cases we see an advance upon this: the raised spaces between the figures being chiseled off and the figures themselves appropriately tinted, a painted bas-relief was produced. The restored Assyrian architecture at Sydenham exhibits this style of art carried to greater perfection—the persons and things represented, though still barbarously coloured, are carved out with more truth and in greater detail: and in the winged lions and bulls used for the angles of gateways we may see a considerable advance towards a completely sculptured figure; which nevertheless is still coloured, and still forms part of the building. But while in Assyria the production of a statue proper seems to have been little if at all attempted, we may trace in Egyptian art the gradual

separation of the sculptured figure from the wall. A walk through the collection in the British Museum shows this; while at the same time it affords an opportunity of observing the traces which the independent statues bear of their derivation from bas-relief: seeing that nearly all of them not only display that fusion of the legs with one another and of the arms with the body which is characteristic of bas-relief, but have the back united from head to foot with a block which stands in place of the original wall. Greece repeated the leading stages of this progress. On the friezes of Greek temples were coloured bas-reliefs representing sacrifices, battles, processions, games—all in some sort religious. The pediments contained painted sculptures more or less united with the tympanum, and having for subjects the triumphs of gods or heroes. Even statues definitely separated from buildings were coloured; and only in the later periods of Greek civilization does the differentiation of sculpture from painting appear to have become complete. In Christian art we may trace a parallel re-genesis. All early works of art throughout Europe were religious in subject—represented Christs, crucifixions, virgins, holy families, apostles, saints. They formed integral parts of church architecture, and were among the means of exciting worship; as in Roman Catholic countries they still are. Moreover, the sculptured figures of Christ on the cross, of virgins, of saints, were coloured; and it needs but to call to mind the painted madonnas still abundant in continental churches and highways, to perceive the significant fact that painting and sculpture continue in closest connection with each other where they continue in closest connection with their parent. Even when Christian sculpture became differentiated from painting, it was still religious and governmental in its subjects—was used for tombs in churches and statues of kings; while at the same time painting, where not purely ecclesiastical, was applied to the decoration of palaces, and besides representing royal personages, was mostly devoted to sacred legends. Only in recent times have painting and sculpture become quite separate and mainly secular. Only within these few centuries has painting been divided into historical, landscape, marine, architectural, genre, animal, still-life, etc.; and sculpture grown heterogeneous in respect of the variety of real and ideal subjects with which it occupies itself.

Strange as it seems then, we find that all forms of written language, of painting, and of sculpture, have a common root in the politico-religious decorations of ancient temples and palaces. Little resemblance as they now have, the landscape that hangs against the wall, and the

copy of the Times lying on the table, are remotely akin. The brazen face of the knocker which the postman has just lifted is related not only to the wood cuts of the Illustrated London News which he is delivering, but to the characters of the *billet-doux* which accompanies it. Between the painted window, the prayer-book on which its light falls, and the adjacent monument, there is consanguinity. The effigies on our coins, the signs over shops, the coat of arms outside the carriage panel, and the placards inside the omnibus, are, in common with dolls and paper-hangings, lineally descended from the rude sculpture-paintings in which ancient peoples represented the triumphs and worship of their god-kings. Perhaps no example can be given which more vividly illustrates the multiplicity and heterogeneity of the products that in course of time may arise by successive differentiations from a common stock.

Before passing to other classes of facts it should be observed that the evolution of the homogeneous into the heterogeneous is displayed not only in the separation of painting and sculpture from architecture and from each other, and in the greater variety of subjects they embody, but it is further shown in the structure of each work. A modern picture or statue is of far more heterogeneous nature than an ancient one. An Egyptian sculpture-fresco usually represents all its figures as at the same distance from the eye; and so is less heterogeneous than a painting that represents them as at various distances from the eye. It exhibits all objects as exposed to the same degree of light; and so is less heterogeneous than a painting which exhibits its different objects and different parts of each object as in different degrees of light. It uses chiefly the primary colours, and these in their full intensities; and so is less heterogeneous than a painting which, introducing the primary colours but sparingly, employs numerous intermediate tints, each of heterogeneous composition, and differing from the rest not only in quality but in strength. Moreover, we see in these early works great uniformity of conception. The same arrangement of figures is perpetually reproduced —the same actions, attitudes, faces, dresses. In Egypt the modes of representation were so fixed that it was sacrilege to introduce a novelty. The Assyrian bas-reliefs display parallel characters. Deities, kings, attendants, winged figures and animals, are time after time depicted in like positions, holding like implements, doing like things, and with like expression or non-expression of face. If a palm grove is introduced, all trees are of the same height, have the same number of leaves, and are equidistant. When water is imitated each wave is a counterpart of the

rest; and the fish, almost always of one kind, are evenly distributed over the surface. The beards of kings, the gods, and the winged figures are everywhere similar; as are the manes of the lions, and equally so those of the horses. Hair is represented throughout by one form of curl. The king's beard is quite architecturally built up of compound tiers of uniform curls, alternating with twisted tiers placed in a transverse direction, and arranged with perfect regularity; and the terminal tufts of the bulls' tails are represented in exactly the same manner. Without tracing out analogous facts in early Christian art, in which, though less striking, they are still visible, the advance in heterogeneity will be sufficiently manifest on remembering that in the pictures of our own day the composition is endlessly varied; the attitudes, faces, expressions, unlike; the subordinate objects different in sizes, forms, textures; and more or less of contrast even in the smallest details. Or, if we compare an Egyptian statue, seated bolt upright on a block, with hands on knees, fingers parallel, eyes looking straight forward, and the two sides perfectly symmetrical in every particular, with a statue of the advanced Greek school or the modern school, which is symmetrical in respect of the attitude of the head, the body, the limbs, the arrangement of the hair, dress, appendages, and in its relations to neighbouring objects, we shall see the change from the homogeneous to the heterogeneous clearly manifested.

In the co-ordinate origin and gradual differentiation of poetry, music, and dancing, we have another series of illustrations. Rhythm in words, rhythm in sounds, and rhythm in motions, were in the beginning parts of the same thing, and have only in process of time become separate things. Among existing barbarous tribes we find them still united. The dances of savages are accompanied by some kind of monotonous chant, the clapping of hands, the striking of rude instruments: there are measured movements, measured words, and measured tones. The early records of historic races similarly show these three forms of metrical action united in religious festivals. In the Hebrew writings we read that the triumphal ode composed by Moses on the defeat of the Egyptians, was sung to an accompaniment of dancing and timbrels. The Israelites danced and sung "at the inauguration of the golden calf. And as it is generally agreed that this representation of the Deity was borrowed from the mysteries of Apis, it is probable that the dancing was copied from that of the Egyptians on those occasions." Again, in Greece the like relation is everywhere seen: the original type being there, as probably in other cases, a simultaneous chanting and mimetic represen-

tation of the life and adventures of the hero or the god. The Spartan dances were accompanied by hymns and songs; and in general the Greeks had "no festivals or religious assemblies but what were accompanied with songs and dances"—both of them being forms of worship used before altars. Among the Romans, too, there were sacred dances: the Salian and Lupercalian being named as of that kind. And even in Christian countries, as at Limoges, in comparatively recent times, the people have danced in the choir in honour of a saint. The incipient separation of these once united arts from each other and from religion was early visible in Greece. Probably diverging from dances partly religious, partly warlike, as the Corybantian, came the war-dances proper, of which there were various kinds. Meanwhile music and poetry, though still united, came to have an existence separate from dancing. The primitive Greek poems, religious in subject, were not recited, but chanted; and though at first the chant of the poet was accompanied by the dance of the chorus, it ultimately grew into independence. Later still, when the poem had been differentiated into epic and lyric—when it became the custom to sing the lyric and recite the epic—poetry proper was born. As during the same period musical instruments were being multiplied, we may presume that music came to have an existence apart from words. And both of them were beginning to assume other forms besides the religious. Facts having like implications might be cited from the histories of later times and peoples; as the practices of our own early minstrels, who sang to the harp heroic narratives versified by themselves to music of their own composition: thus uniting the now separate offices of poet, composer, vocalist, and instrumentalist. But, without further illustration, the common origin and gradual differentiation of dancing, poetry, and music will be sufficiently manifest.

The advance from the homogeneous to the heterogeneous is displayed not only in the separation of these arts from each other and from religion, but also in the multiplied differentiations which each of them afterwards undergoes. Not to dwell upon the numberless kinds of dancing that have, in course of time, come into use: and not to occupy space in detailing the progress of poetry, as seen in the development of the various forms of metre, of rhyme, and of general organization; let us confine our attention to music as a type of the group. As implied by the customs of still extant barbarous races, the first musical instruments were, without doubt, percussive—sticks, calabashes, tom-toms—and were used simply to mark the time of the dance; and in this constant

repetition of the same sound we see music in its most homogeneous form. The Egyptians had a lyre with three strings. The early lyre of the Greeks had four, constituting their tetrachord. In course of some centuries lyres of seven and eight strings were employed; and, by the expiration of a thousand years they had advanced to their "great system" of the double octave. Through all which changes there of course arose a greater heterogeneity of melody. Simultaneously there came into use the different modes—Dorian, Ionian, Phrygian, Æolian, and Lydian—answering to our keys; and of these there were ultimately fifteen. As yet, however, there was but little heterogeneity in the time of their music. Instrumental music being at first merely the accompaniment of vocal music, and vocal music being subordinated to words—the singer being also the poet, chanting his own compositions and making the lengths of his notes agree with the feet of his verses—there resulted a tiresome uniformity of measure, which, as Dr. Burney says, "no resources of melody could disguise." Lacking the complex rhythm obtained by our equal bars and unequal notes, the only rhythm was that produced by the quantity of the syllables, and was of necessity comparatively monotonous. And further, it may be observed that the chant thus resulting, being like recitative, was much less clearly differentiated from ordinary speech than is our modern song. Nevertheless, in virtue of the extended range of notes in use, the variety of modes, the occasional variations of time consequent on changes of metre, and the multiplication of instruments, music had, towards the close of Greek civilization, attained to considerable heterogeneity—not indeed as compared with our music, but as compared with that which preceded it. Still there existed nothing but melody: harmony was unknown. It was not until Christian church-music had reached some development, that music in parts was evolved; and then it came into existence through a very unobtrusive differentiation. Difficult as it may be to conceive *a priori* how the advance from melody to harmony could take place without a sudden leap, it is none the less true that it did so. The circumstance which prepared the way for it was the employment of two choirs singing alternately the same air. Afterwards it became the practice—very possibly first suggested by a mistake—for the second choir to commence before the first had ceased; thus producing a fugue. With the simple airs then in use, a partially harmonious fugue might not improbably thus result: and a very partially harmonious fugue satisfied the ears of that age, as we know from still preserved examples. The idea having once been

given, the composing of airs productive of fugal harmony would naturally grow up, as in some way it did grow up, out of this alternate choir-singing. And from the fugue to concerted music of two, three, four, and more parts, the transition was easy. Without pointing out in detail the increasing complexity that resulted from introducing notes of various lengths, from the multiplication of keys, from the use of accidentals, from varieties of time, and so forth, it needs but to contrast music as it is, with music as it was, to see how immense is the increase of heterogeneity We see this if, looking at music in its *ensemble,* we enumerate its many different genera and species—if we consider the divisions into vocal, instrumental, and mixed; and their subdivisions into music for different voices and different instruments—if we observe the many different forms of sacred music, from the simple hymn, the chant, the canon, motet, anthem, etc., up to the oratorio; and the still more numerous forms of secular music, from the ballad up to the serenata, from the instrumental solo up to the symphony. Again, the same truth is seen on comparing any one sample of aboriginal music with a sample of modern music—even an ordinary song for the piano; which we find to be relatively very heterogeneous, not only in respect of the variety in the pitches and in the lengths of the notes, the number of different notes sounding at the same instant in company with the voice, and the variations of strength with which they are sounded and sung, but in respect of the changes of key, the changes of time, the changes of *timbre* of the voice, and the many other modifications of expression. While between the old monotonous dance-chant and a grand opera of our own day, with its endless orchestral complexities and vocal combinations, the contrast in heterogeneity is so extreme that it seems scarcely credible that the one should have been the ancestor of the other.

Were they needed, many further illustrations might be cited. Going back to the early time when the deeds of the god-king were recorded in picture-writings on the walls of temples and palaces, and so constituted a rude literature, we might trace the development of Literature through phases in which, as in the Hebrew Scriptures, it presents in one work theology, cosmogony, history, biography, law, ethics, poetry; down to its present heterogeneous development, in which its separated divisions and subdivisions are so numerous and varied as to defy complete classification. Or we might trace out the evolution of Science; beginning with the era in which it was not yet differentiated from Art, and was, in union with Art, the handmaid of Religion; passing through

the era in which the sciences were so few and rudimentary, as to be simultaneously cultivated by the same men; and ending with the era in which the genera and species are so numerous that few can enumerate them, and no one can adequately grasp even one genus. Or we might do the like with Architecture, with the Drama, with Dress. But doubtless the reader is already weary of illustrations; and our promise has been amply fulfilled. Abundant proof has been given that the law of organic development formulated by von Baer, is the law of all development. The advance from the simple to the complex, through a process of successive differentiations, is seen alike in the earliest changes of the Universe to which we can reason our way back, and in the earliest changes which we can inductively establish; it is seen in the geologic and climatic evolution of the Earth; it is seen in the unfolding of every single organism on its surface, and in the multiplication of kinds of organisms; it is seen in the evolution of Humanity, whether contemplated in the civilized individual, or in the aggregate of races; it is seen in the evolution of Society in respect alike of its political, its religious, and its economical organization; and it is seen in the evolution of all those endless concrete and abstract products of human activity which constitute the environment of our daily life. From the remotest past which Science can fathom, up to the novelties of yesterday, that in which progress essentially consists is the transformation of the homogeneous into the heterogeneous.

And now, must not this uniformity of procedure be a consequence of some fundamental necessity? May we not rationally seek for some all-pervading principle which determines this all-pervading process of things? Does not the universality of the law imply a universal cause?

That we can comprehend such cause, noumenally considered, is not to be supposed. To do this would be to solve that ultimate mystery which must ever transcend human intelligence. But it still may be possible for us to reduce the law of all progress, above set forth, from the condition of an empirical generalization, to the condition of a rational generalization. Just as it was possible to interpret Kepler's laws as necessary consequences of the law of gravitation; so it may be possible to interpret this law of progress, in its multiform manifestations, as the necessary consequence of some similarly universal principle. As gravitation was assignable as the cause of each of the groups of phenomena which Kepler generalized; so may some equally simple attribute of things be assignable as the cause of each of the groups of phenomena

generalized in the foregoing pages. We may be able to affiliate all these varied evolutions of the homogeneous into the heterogeneous, upon certain facts of immediate experience, which, in virtue of endless repetition, we regard as necessary.

The probability of a common cause, and the possibility of formulating it, being granted, it will be well, first, to ask what must be the general characteristics of such cause, and in what direction we ought to look for it. We can with certainty predict that it has a high degree of abstractness; seeing that it is common to such infinitely-varied phenomena. We need not expect to see in it an obvious solution of this or that form of progress; because it is equally concerned with forms of progress bearing little apparent resemblance to them: its association with multiform orders of facts involves its dissociation from any particular order of facts. Being that which determines progress of every kind—astronomic, geologic, organic, ethnologic, social, economic, artistic, &c.—it must be involved with some fundamental trait displayed in common by these; and must be expressible in terms of this fundamental trait. The only obvious respect in which all kinds of progress are alike, is, that they are modes of change; and hence, in some characteristic of changes in general, the desired solution will probably be found. We may suspect *a priori* that in some universal law of change lies the explanation of this universal transformation of the homogeneous into the heterogeneous.

Thus much premised, we pass at once to the statement of the law, which is this:—Every active force produces more than one change—every cause produces more than one effect.

To make this proposition comprehensible, a few examples must be given. When one body strikes another, that which we usually regard as the effect, is a change of position or motion in one or both bodies. But a moment's thought shows us that this is a very incomplete view of the matter. Besides the visible mechanical result, sound is produced; or, to speak accurately, a vibration in one or both bodies, which is communicated to the surrounding air; and under some circumstances we call this the effect. Moreover, the air has not only been made to undulate, but has had currents caused in it by the transit of the bodies. Further, there is a disarrangement of the particles of the two bodies in the neighbourhood of their point of collision; amounting, in some cases, to a visible condensation. Yet more, this condensation is accompanied by the disengagement of heat. In some cases a spark—that is, light—

results, from the incandescence of a portion struck off; and sometimes this incandescence is associated with chemical combination. Thus, by the mechanical force expended in the collision, at least five, and often more, different kinds of changes have been produced. Take, again, the lighting of a candle. Primarily this is a chemical change consequent on a rise of temperature. The process of combination having once been started by extraneous heat, there is a continued formation of carbonic acid, water, &c.—in itself a result more complex than the extraneous heat that first caused it. But accompanying this process of combination there is a production of heat; there is a production of light; there is an ascending column of hot gases generated; there are inflowing currents set going in the surrounding air. Moreover, the complicating of effects does not end here: each of the several changes produced becomes the parent of further changes. The carbonic acid given off will by and by combine with some base; or under the influence of sunshine give up its carbon to the leaf of a plant. The water will modify the hygrometric state of the air around; or, if the current of hot gases containing it comes against a cold body, will be condensed: altering the temperature of the surface it covers. The heat given out melts the subjacent tallow, and expands whatever it warms. The light, falling on various substances, calls forth from them reactions by which its composition is modified; and so divers colours are produced. Similarly even with these secondary actions, which may be traced out into ever-multiplying ramifications, until they become too minute to be appreciated. And thus it is with all changes whatever. No case can be named in which an active force does not evolve forces of several kinds, and each of these, other groups of forces. Universally the effect is more complex than the cause.

Doubtless the reader already foresees the course of our argument. This multiplication of effects, which is displayed in every event of to-day, has been going on from the beginning; and is true of the grandest phenomena of the universe as of the most insignificant. From the law that every active force produces more than one change, it is an inevitable corollary that during the past there has been an ever-growing complication of things. Throughout creation there must have gone on, and must still go on, a never-ceasing transformation of the homogeneous into the heterogeneous. Let us trace this truth in detail.

Without committing ourselves to it as more than a speculation, though a highly probable one, let us again commence with the evolution of the Solar System out of a nebulous medium. The hypothesis is that

from the mutual attraction of the molecules of a diffused mass whose form is unsymmetrical, there results not only condensation but rotation. While the condensation and the rate of rotation go on increasing, the approach of the molecules is necessarily accompanied by an increasing temperature. As the temperature rises, light begins to be evolved; and ultimately there results a revolving sphere of fluid matter radiating intense heat and light—a sun. There are reasons for believing that, in consequence of the higher tangential velocity originally possessed by the outer parts of the condensing nebulous mass, there will be occasional detachments of rotating rings; and that, from the breaking up of these nebulous rings, there will arise masses which in the course of their condensation repeat the actions of the parent mass, and so produce planets and their satellites—an inference strongly supported by the still extant rings of Saturn. Should it hereafter be satisfactorily shown that planets and satellites were thus generated, a striking illustration will be afforded of the highly heterogeneous effects produced by the primary homogeneous cause; but it will serve our present purpose to point to the fact that from the mutual attraction of the particles of an irregular nebulous mass there result condensation, rotation, heat, and light.

It follows as a corollary from the Nebular Hypothesis, that the Earth must once have been incandescent; and whether the Nebular Hypothesis be true or not, this original incandescence of the Earth is now inductively established—or, if not established, at least rendered so highly probable that it is an accepted geological doctrine. Let us look first at the astronomical attributes of this once molten globe. From its rotation there result the oblateness of its form, the alternations of day and night, and (under the influence of the moon and in a smaller degree the sun) the tides, aqueous and atmospheric. From the inclination of its axis, there result the many differences of the seasons, both simultaneous and successive, that pervade its surface, and from the same cause joined with the action of the moon on the equatorial protuberance there results the precession of the equinoxes. Thus the multiplication of effects is obvious. Several of the differentiations due to the gradual cooling of the Earth have been already noticed—as the formation of a crust, the solidification of sublimed elements, the precipitation of water, &c.,—and we here again refer to them merely to point out that they are simultaneous effects of the one cause, diminishing heat. Let us now, however, observe the multiplied changes afterwards arising from the continuance of this one cause. The cooling of the Earth involves its

contraction. Hence the solid crust first formed is presently too large for the shrinking nucleus; and as it cannot support itself, inevitably follows the nucleus. But a spheroidal envelope cannot sink down into contact with a smaller internal spheroid, without disruption: it must run into wrinkles as the rind of an apple does when the bulk of its interior decreases from evaporation. As the cooling progresses and the envelope thickens, the ridges consequent on these contractions will become greater, rising ultimately into hills and mountains; and the later systems of mountains thus produced will not only be higher, as we find them to be, but will be longer, as we also find them to be. Thus, leaving out of view other modifying forces, we see what immense heterogeneity of surface has arisen from the one cause, loss of heat—a heterogeneity which the telescope shows us to be paralleled on the face of Mars, and which in the moon too, where aqueous and atmospheric agencies have been absent, it reveals under a somewhat different form. But we have yet to notice another kind of heterogeneity of surface similarly and simultaneously caused. While the Earth's crust was still thin, the ridges produced by its contraction must not only have been small, but the spaces between these ridges must have rested with great evenness upon the subjacent liquid spheroid; and the water in those arctic and antarctic regions in which it first condensed, must have been evenly distributed. But as fast as the crust thickened and gained corresponding strength, the lines of fracture from time to time caused in it, must have occurred at greater distances apart; the intermediate surfaces must have followed the contracting nucleus with less uniformity; and there must have resulted larger areas of land and water. If anyone, after wrapping up an orange in tissue paper, and observing not only how small are the wrinkles, but how evenly the intervening spaces lie upon the surface of the orange, will then wrap it up in thick cartridge-paper, and note both the greater height of the ridges and the larger spaces throughout which the paper does not touch the orange, he will realize the fact that, as the Earth's solid envelope grew thicker, the areas of elevation and depression increased. In place of islands homogeneously dispersed amid an all-embracing sea, there must have gradually arisen heterogeneous arrangements of continent and ocean. Once more, this double change in the extent and in the elevation of the lands, involved yet another species of heterogeneity—that of coast-line. A tolerably even surface raised out of the ocean must have a simple, regular sea-margin; but a surface varied by table-lands and intersected by mountain-chains must, when raised out

of the ocean, have an outline extremely irregular both in its leading features and in its details. Thus, multitudinous geological and geographical results are slowly brought about by this one cause—the contraction of the Earth.

When we pass from the agency termed igneous, to aqueous and atmospheric agencies, we see the like ever-growing complications of effects. The denuding actions of air and water, joined with those of changing temperature, have, from the beginning, been modifying every exposed surface. Oxidation, heat, wind, frost, rain, glaciers, rivers, tides, waves, have been unceasingly producing disintegration; varying in kind and amount according to local circumstances. Acting upon a tract of granite, they here work scarcely an appreciable effect; there cause exfoliations of the surface, and a resulting heap of debris and boulders; and elsewhere, after decomposing the feldspar into a white clay, carry away this and the accompanying quartz and mica, and deposit them in separate beds, fluviatile and marine. When the exposed land consists of several unlike kinds of sedimentary strata, or igneous rocks, or both, denudation produces changes proportionably more heterogeneous. The formations being disintegrable in different degrees, there follows an increased irregularity of surface. The areas drained by different rivers being differently constituted, these rivers carry down to the sea different combinations of ingredients; and so sundry new strata of unlike compositions are formed. And here we may see very simply illustrated, the truth, which we shall presently have to trace out in more involved cases, that in proportion to the heterogeneity of the object or objects on which any force expends itself, is the heterogeneity of the effects. A continent of complex structure, exposing many strata irregularly distributed, raised to various levels, tilted up at all angles, will, under the same denuding agencies, give origin to innumerable and involved results: each district must be differently modified; each river must carry down a different kind of detritus; each deposit must be differently distributed by the entangled currents, tidal and other, which wash the contorted shores; and this multiplication of results must manifestly be greatest where the complexity of surface is greatest.

Here we might show how the general truth, that every active force produces more than one change, is again exemplified in the highly-involved flow of the tides, in the ocean currents, in the winds, in the distribution of rain, in the distribution of heat, and so forth. But not

to dwell upon these, let us, for the fuller elucidation of this truth in relation to the inorganic world, consider what would be the consequences of some extensive cosmical catastrophe—say the subsidence of Central America. The immediate results of the disturbance would themselves be sufficiently complex. Besides the numberless dislocations of strata, the ejections of igneous matter, the propagation of earthquake vibrations thousands of miles around, the loud explosions, and the escape of gases; there would be the rush of the Atlantic and Pacific Oceans to fill the vacant space, the subsequent recoil of enormous waves, which would traverse both these oceans and produce myriads of changes along their shores, the corresponding atmospheric waves complicated by the currents surrounding each volcanic vent, and the electrical discharges with which such disturbances are accompanied. But these temporary effects would be insignificant compared with the permanent ones. The currents of the Atlantic and Pacific would be altered in their directions and amounts. The distribution of heat achieved by these ocean currents would be different from what it is. The arrangement of the isothermal lines, not only on neighbouring continents, but even throughout Europe, would be changed. The tides would flow differently from what they do now. There would be more or less modifications of the winds in their periods, strengths, directions, qualities. Rain would fall scarcely anywhere at the same times and in the same quantities as at present. In short, the meteorological conditions thousands of miles off, on all sides, would be more or less revolutionized. Thus, without taking into account the infinitude of modifications which these changes would produce upon the flora and fauna, both of land and sea, the reader will perceive the immense heterogeneity of the results wrought out by one force, when that force expends itself upon a previously complicated area; and he will draw the corollary that from the beginning the complication has advanced at an increasing rate.

Before going on to show how organic progress also depends on the law that every force produces more than one change, we have to notice the manifestation of this law in yet another species of inorganic progress—namely, chemical. The same general causes that have wrought out the heterogeneity of the Earth, physically considered, have simultaneously wrought out its chemical heterogeneity. There is every reason to believe that at an extreme heat the elements cannot combine. Even under such heat as can be artificially produced, some very strong affinities yield, as, for instance, that of oxygen for hydrogen; and the great

majority of chemical compounds are decomposed at much lower temperatures. But without insisting on the highly probable inference, that when the Earth was in its first state of incandescence there were no chemical combinations at all, it will suffice for our purpose to point to the unquestionable fact that the compounds which can exist at the highest temperatures, and which must, therefore, have been the first that were formed as the Earth cooled, are those of the simplest constitutions. The protoxides—including under that head the alkalies, earths, &c.—are, as a class, the most stable compounds we know: most of them resisting decomposition by any heat we can generate. These are combinations of the simplest order—are but one degree less homogeneous than the elements themselves. More heterogeneous, less stable, and therefore later in the Earth's history, are the deutoxides, tritoxides, peroxides, &c.; in which two, three, four, or more atoms of oxygen are united with one atom of metal or other element. Higher than these in heterogeneity are the hydrates; in which an oxide of hydrogen, united with an oxide of some other element, forms a substance whose atoms severally contain at least four ultimate atoms of three different kinds. Yet more heterogeneous and less stable still are the salts; which present us with molecules each made up of five, six, seven, eight, ten, twelve, or more atoms, of three, if not more kinds. Then there are the hydrated salts, of a yet greater heterogeneity, which undergo partial decomposition at much lower temperatures. After them come the further complicated super-salts and double salts, having a stability again decreased; and so throughout. Without entering into qualifications for which space fails, we believe no chemist will deny it to be a general law of these inorganic combinations that, other things equal, the stability decreases as the complexity increases. When we pass to the compounds of organic chemistry, we find this general law still further exemplified: we find much greater complexity and much less stability. A molecule of albumen, for instance, consists of 482 ultimate atoms of five different kinds. Fibrine, still more intricate in constitution, contains in each molecule, 298 atoms of carbon, 49 of nitrogen, 2 of sulphur, 228 of hydrogen, and 92 of oxygen—in all, 669 atoms; or, more strictly speaking, equivalents. And these two substances are so unstable as to decompose at quite ordinary temperatures; as that to which the outside of a joint of roast meat is exposed. Thus it is manifest that the present chemical heterogeneity of the Earth's surface has arisen by degrees, as the decrease of heat has permitted; and that it has shown itself in three forms—first, in the multiplication of chemical

compounds; second, in the greater number of different elements contained in the more modern of these compounds; and third, in the higher and more varied multiples in which these more numerous elements combine.

To say that this advance in chemical heterogeneity is due to the one cause, diminution of the Earth's temperature, would be to say too much; for it is clear that aqueous and atmospheric agencies have been concerned; and further, that the affinities of the elements themselves are implied. The cause has all along been a composite one: the cooling of the Earth having been simply the most general of the concurrent causes, or assemblage of conditions. And here, indeed, it may be remarked that in the several classes of facts already dealt with (excepting, perhaps, the first), and still more in those with which we shall presently deal, the causes are more or less compound; as indeed are nearly all causes with which we are acquainted. Scarcely any change can rightly be ascribed to one agency alone, to the neglect of the permanent or temporary conditions under which only this agency produces the change. But as it does not materially affect our argument, we prefer, for simplicity's sake, to use throughout the popular mode of expression. Perhaps it will be further objected, that to assign loss of heat as the cause of any changes, is to attribute these changes not to a force, but to the absence of a force. And this is true. Strictly speaking, the changes should be attributed to those forces which come into action when the antagonist force is withdrawn. But though there is inaccuracy in saying that the freezing of water is due to the loss of its heat, no practical error arises from it; nor will a parallel laxity of expression vitiate our statements respecting the multiplication of effects. Indeed, the objection serves but to draw attention to the fact, that not only does the exertion of a force produce more than one change, but the withdrawal of a force produces more than one change.

Returning to the thread of our exposition, we have next to trace, throughout organic progress, this same all-pervading principle. And here, where the evolution of the homogeneous into the heterogeneous was first observed, the production of many effects by one cause is least easy to demonstrate. The development of a seed into a plant, or an ovum into an animal, is so gradual, while the forces which determine it are so involved, and at the same time so unobtrusive, that it is difficult to detect the multiplication of effects which is elsewhere so obvious. But, guided by indirect evidence, we may safely conclude that here too

the law holds. Note, first, how numerous are the changes which any marked action works upon an adult organism—a human being, for instance. An alarming sound or sight, besides the impressions on the organs of sense and the nerves, may produce a start, a scream, a distortion of the face, a trembling consequent on general muscular relaxation, a burst of perspiration, a rush of blood to the brain, followed possibly by arrest of the heart's action and by syncope; and if the subject be feeble, an indisposition with its long train of complicated symptoms may set it. Similarly in cases of disease. A minute portion of the small-pox virus introduced into the system, will, in a severe case, cause, during the first stage, rigors, heat of skin, accelerated pulse, furred tongue, loss of appetite, thirst, epigastric uneasiness, vomiting, headache, pains in the back and limbs, muscular weakness, convulsions, delirium, &c.; in the second stage, cutaneous eruption, itching, tingling, sore throat, swelled fauces, salivation, cough, hoarseness, dyspnœa, &c.; and in the third stage, œdematous inflammations, pneumonia, pleurisy, diarrhœa, inflammation of the brain, ophthalmia, erysipelas, &c.; each of which enumerated symptoms is itself more or less complex. Medicines, special foods, better air, might in like manner be instanced as producing multiplied results. Now it needs only to consider that the many changes thus wrought by one force upon an adult organism, will be in part paralleled in an embryo organism, to understand how here also, the evolution of the homogeneous into the heterogeneous may be due to the production of many effects by one cause. The external heat, which, falling on a matter having special proclivities, determines the first complications of the germ, may, by acting on these, superinduce further complications; upon these still higher and more numerous ones; and so on continually: each organ as it is developed serving, by its actions and reactions on the rest, to initiate new complexities. The first pulsations of the fœtal heart must simultaneously aid the unfolding of every part. The growth of each tissue, by taking from the blood special proportions of elements, must modify the constitution of the blood; and so must modify the nutrition of all the other tissues. The heart's action, implying as it does a certain waste, necessitates an addition to the blood of effete matters, which must influence the rest of the system, and perhaps, as some think, cause the formation of excretory organs. The nervous connexions established among the viscera must further multiply their mutual influences; and so continually. Still stronger becomes the probability of this view when we call to mind the fact, that the same germ

may be evolved into different forms according to circumstances. Thus, during its earlier stages, every embryo is sexless—becomes either male or female as the balance of forces acting on it determines. Again, it is a well-established fact that the larva of a working-bee will develop into a queen-bee, if before it is too late, its food be changed to that on which the larvae of queen-bees are fed. All which instances suggest that the proximate cause of each advance in embryonic complication is the action of incident forces upon the complication previously existing. Indeed, we may find *a priori* reason to think that the evolution proceeds after this manner. For since no germ, animal or vegetable, contains the slightest rudiment or indication of the future organism—since the microscope has shown us that the first process set up in every fertilized germ, is a process of repeated spontaneous fissions ending in the production of a mass of cells, not one of which exhibits any special character; there seems no alternative but to suppose that the partial organization at any moment existing in a growing embryo, is transformed by the agencies acting upon it into the succeeding phase of organization, and this into the next, until, through ever-increasing complexities, the ultimate form is reached. Not indeed that we can thus really explain the production of any plant or animal. We are still in the dark respecting those mysterious properties in virtue of which the germ, when subject to fit influences, undergoes the special changes that begin the series of transformations. All we aim to show, is, that given a germ possessing those particular proclivities distinguishing the species to which it belongs, and the evolution of an organism from it, probably depends on that multiplication of effects which we have seen to be the cause of progress in general, so far as we have yet traced it.

When, leaving the development of single plants and animals, we pass to that of the Earth's flora and fauna, the course of our argument again becomes clear and simple. Though, as was admitted in the first part of this article, the fragmentary facts Paleontology has accumulated, do not clearly warrant us in saying that, in the lapse of geologic time, there have been evolved more heterogeneous organisms, and more heterogeneous assemblages of organisms, yet we shall now see that there must ever have been a tendency towards these results. We shall find that the production of many effects by one cause, which as already shown, has been all along increasing the physical heterogeneity of the Earth, has further involved an increasing heterogeneity in its flora and fauna, individually and collectively. An illustration will make this clear.

Suppose that by a series of upheavals, occurring, as they are now known to do, at long intervals, the East Indian Archipelago were to be, step by step, raised into a continent, and a chain of mountains formed along the axis of elevation. By the first of these upheavals, the plants and animals inhabiting Borneo, Sumatra, New Guinea, and the rest, would be subjected to slightly modified sets of conditions. The climate in general would be altered in temperature, in humidity, and in its periodical variations; while the local differences would be multiplied. These modifications would affect, perhaps inappreciably, the entire flora and fauna of the region. The change of level would produce additional modifications: varying in different species, and also in different members of the same species, according to their distance from the axis of elevation. Plants, growing only on the sea-shore in special localities, might become extinct. Others, living only in swamps of a certain humidity, would, if they survived at all, probably undergo visible changes of appearance. While still greater alterations would occur in the plants gradually spreading over the lands newly raised above the sea. The animals and insects living on these modified plants, would themselves be in some degree modified by change of food, as well as by change of climate; and the modification would be more marked where, from the dwindling or disappearance of one kind of plant, an allied kind was eaten. In the lapse of the many generations arising before the next upheaval, the sensible or insensible alterations thus produced in each species would become organized—there would be a more or less complete adaptation to the new conditions. The next upheaval would superinduce further organic changes, implying wider divergences from the primary forms; and so repeatedly. But now let it be observed that the revolution thus resulting would not be a substitution of a thousand more or less modified species for the thousand original species; but in place of the thousand original species there would arise several thousand species, or varieties, or changed forms. Each species being distributed over an area of some extent, and tending continually to colonize the new area exposed, its different members would be subject to different sets of changes. Plants and animals spreading towards the equator would not be affected in the same way as others spreading from it. Those spreading towards the new shores would undergo changes unlike the changes undergone by those spreading into the mountains. Thus, each original race of organisms, would become the root from which diverged several races differing more or less from it and from each

other; and while some of these might subsequently disappear, probably more than one would survive in the next geologic period: the very dispersion itself increasing the chances of survival. Not only would there be certain modifications thus caused by change of physical conditions and food, but also in some cases other modifications caused by change of habit. The fauna of each island, peopling, step by step, the newly-raised tracts, would eventually come in contact with the faunas of other islands; and some members of these other faunas would be unlike any creatures before seen. Herbivores meeting with new beasts of prey, would, in some cases, be led into modes of defence or escape differing from those previously used; and simultaneously the beasts of prey would modify their modes of pursuit and attack. We know that when circumstances demand it, such changes of habit do take place in animals; and we know that if the new habits become the dominant ones, they must eventually in some degree alter the organization. Observe now, however, a further consequence. There must arise not simply a tendency towards the differentiation of each race of organisms into several races; but also a tendency to the occasional production of a somewhat higher organism. Taken in the mass these divergent varieties which have been caused by fresh physical conditions and habits of life, will exhibit changes quite indefinite in kind and degree; and changes that do not necessarily constitute an advance. Probably in most cases the modified type will be neither more nor less heterogeneous than the original one. In some cases the habits of life adopted being simpler than before, a less heterogeneous structure will result; there will be a retrogradation. But it must now and then occur, that some division of a species, falling into circumstances which give it rather more complex experiences, and demand actions somewhat more involved, will have certain of its organs further differentiated in proportionately small degrees,—will become slightly more heterogeneous. Thus, in the natural course of things, there will from time to time arise an increased heterogeneity both of the Earth's flora and fauna, and of individual races included in them. Omitting detailed explanations, and allowing for the qualifications which cannot here be specified, we think it is clear that geological mutations have all along tended to complicate the forms of life, whether regarded separately or collectively. The same causes which have led to the evolution of the earth's crust from the simple into the complex, have simultaneously led to a parallel evolution of the life upon its surface. In this case, as in previous ones, we see that the transformation of the homo-

geneous into the heterogeneous is consequent upon the universal principle that every active force produces more than one change.

The deduction here drawn from the established truths of geology and the general laws of life, gains immensely in weight on finding it to be in harmony with an induction drawn from direct experience. Just that divergence of many races from one race, which we inferred must have been continually occurring during geologic time, we know to have occurred during the prehistoric and historic periods, in man and domestic animals. And just that multiplication of effects which we concluded must have produced the first, we see has produced the last. Single causes, as famine, pressure of population, war, have periodically led to further dispersions of mankind and of dependent creatures: each such dispersion initiating new modifications, new varieties of type. Whether all the human races be or be not derived from one stock, philology makes it clear that whole groups of races now easily distinguishable from each other, were originally one race—that the diffusion of one race into different climates and conditions of existence, has produced many modified forms of it. Similarly with domestic animals. Though in some cases—as that of dogs—community of origin will perhaps be disputed, yet in other cases—as that of the sheep or the cattle of our own country—it will not be questioned that local differences of climate, food, and treatment, have transformed one original breed into numerous breeds now become so far distinct as to produce unstable hybrids. Moreover, through the complication of effects flowing from single causes, we here find, what we before inferred, not only an increase of general heterogeneity, but also of special heterogeneity. While of the divergent divisions and subdivisions of the human race many have undergone changes not constituting an advance; while in some the type may have degraded; in others it has become decidedly more heterogeneous. The civilized European departs more widely from the vertebrate archetype than does the savage. Thus, both the law and the cause of progress, which, from lack of evidence, can be but hypothetically substantiated in respect of the earlier forms of life on our globe, can be actually substantiated in respect of the latest forms.

If the advance of man towards greater heterogeneity is traceable to the production of many effects by one cause, still more clearly may the advance of society towards greater heterogeneity be so explained. Consider the growth of an industrial organization. When, as must occasionally happen, some member of a tribe displays unusual aptitude for

making an article of general use—a weapon, for instance—which was before made by each man for himself, there arises a tendency towards the differentiation of that member into a maker of such weapon. His companions—warriors and hunters all of them—severally feel the importance of having the best weapons that can be made; and are therefore certain to offer strong inducements to this skilled individual to make weapons for them. He, on the other hand, having not only an unusual faculty, but an unusual liking, for making such weapons (the talent and the desire for any occupation being commonly associated), is predisposed to fulfill each commission on the offer of an adequate reward: especially as his love of distinction is also gratified and his living facilitated. The first specialization of function, once commenced, tends ever to become more decided. On the side of the weapon-maker practice gives increased skill—increased superiority to his products. On the side of his clients, cessation of practice entails decreased skill. Thus the influences which determine this division of labour grow stronger in both ways; and the incipient heterogeneity is, on the average of cases, likely to become permanent for that generation if no longer. This process not only differentiates the social mass into two parts, the one monopolizing, or almost monopolizing, the performance of a certain function, and the other losing the habit, and in some measure the power, of performing that function; but it tends to initiate other differentiations. The advance described implies the introduction of barter—the maker of weapons has, on each occasion, to be paid in such other articles as he agrees to take in exchange. He will not habitually take in exchange one kind of article, but many kinds. He does not want mats only, or skins, or fishing-gear, but he wants all these, and on each occasion will bargain for the particular things he most needs. What follows? If among his fellows there exist any slight differences of skill in the manufacture of these various things, as there are almost sure to do, the weapon-maker will take from each one the thing which that one excels in making: he will exchange in mats with him whose mats are superior, and will bargain for the fishing-gear of him who has the best. But he who has bartered away his mats or his fishing-gear, must make other mats or fishing-gear for himself; and in so doing must, in some degree, further develop his aptitude. Thus it results that the small specialties of faculty possessed by various members of the tribe will tend to grow more decided. And whether or not there ensue distinct differentiations of other individuals into makers of particular articles, it is clear that

incipient differentiations take place throughout the tribe: the one original cause produces not only the first dual effect, but a number of secondary dual effects, like in kind, but minor in degree. This process, of which traces may be seen among schoolboys, cannot well produce lasting effects in an unsettled tribe; but where there grows up a fixed and multiplying community, such differentiations become permanent, and increase with each generation. The enhanced demand for every commodity intensifies the functional activity of each specialized person or class; and this renders the specialization more definite where it already exists, and establishes it where it is but nascent. By increasing the pressure on the means of subsistence, a larger population again augments these results; seeing that each person is forced more and more to confine himself to that which he can do best, and by which he can gain most. Presently, under these same stimuli, new occupations arise. Competing workers, ever aiming to produce improved articles, occasionally discover better processes or raw materials. The substitution of bronze for stone entails on him who first makes it a great increase of demand; so that he or his successor eventually finds all his time occupied in making the bronze for the articles he sells, and is obliged to depute the fashioning of these articles to others; and eventually the making of bronze, thus differentiated from a pre-existing occupation, becomes an occupation by itself. But now mark the ramified changes which follow this change. Bronze presently replaces stone, not only in the articles it was first used for, but in many others—in arms, tools, and utensils of various kinds; and so affects the manufacture of them. Further, it affects the processes which these utensils subserve, and the resulting products—modifies buildings, carvings, personal decorations. Yet again, it sets going manufactures which were before impossible from lack of a material fit for the requisite implements. And all these changes react on the people—increase their manipulative skill, their intelligence, their comfort—refine their habits and tastes. Thus the evolution of a homogeneous society into a heterogeneous one is clearly consequent on the general principle that many effects are produced by one cause.

Space permitting, we might show how the localization of special industries in special parts of a kingdom, as well as the minute subdivision of labour in the making of each commodity, are similarly determined. Or, turning to a somewhat different order of illustrations, we might dwell on the multitudinous changes—material, intellectual, moral—caused by printing; or the further extensive series of changes wrought

by gunpowder. But leaving the intermediate phases of social development, let us take a few illustrations from its most recent and its passing phases. To trace the effects of steam power in its manifold applications to mining, navigation, and manufactures of all kinds, would carry us into unmanageable detail. Let us confine ourselves to the latest embodiment of steam power—the locomotive engine. This, as the proximate cause of our railway system, has changed the face of the country, the course of trade, and the habits of the people. Consider first the complicated sets of changes that precede the making of every railway—the provisional arrangements, the meetings, the registration, the trial section, the parliamentary survey, the lithographed plans, the books of reference, the local deposits and notices, the application to Parliament, the passing standing orders committee, the first, second, and third readings: each of which brief heads indicates a multiplicity of transactions, and the extra development of sundry occupations—as those of engineers, surveyors, lithographers, parliamentary agents, share-brokers; and the creation of sundry others—as those of traffic-takers, reference-takers. Consider next the yet more marked changes implied in railway construction—the cuttings, embankings, tunnelings, diversions of roads; the building of bridges and stations, the laying down of ballast, sleepers, and rails; the making of engines, tenders, carriages, and wagons: which processes, acting on numerous trades, increase the importation of timber, the quarrying of stone, the manufacture of iron, the mining of coal, the burning of bricks; institute a variety of special manufactures weekly advertised in the Railway Times; and finally open the way to sundry new occupations, as those of drivers, stokers, cleaners, plate-layers, etc., etc. And then consider the changes, still more numerous and involved, which railways in action produce on the community at large. Business agencies are established where previously they would not have paid; goods are obtained from remote wholesale houses instead of near retail ones; and commodities are used which distance once rendered inaccessible. Again, the diminished cost of carriage tends to specialize more than ever the industries of different districts—to confine each manufacture to the parts in which, from local advantages, it can be best carried on. Further, the fall in freights, facilitating distribution, equalizes prices, and also, on the average, lowers prices: thus bringing divers articles within the means of those before unable to buy them, and so increasing their comforts and improving their habits. At the same time the practice of traveling is immensely extended. People who never

before dreamed of it, take trips to the sea; visit their distant relations; make tours; and so we are benefited in body, feelings, and ideas. The more prompt transmission of letters and of news produces other marked changes—makes the pulse of the nation faster. Once more, there arises a wide dissemination of cheap literature through railway book-stalls, and of advertisements in railway carriages: both of them aiding ulterior progress. And the countless changes here briefly indicated are consequent on the invention of the locomotive engine. The social organism has been rendered more heterogeneous in virtue of the many new occupations introduced, and the many old ones further specialized; prices of nearly all things in every place have been altered; each trader has modified his way of doing business; and every person has been affected in his actions, thoughts, emotions.

Illustrations to the same effect might be indefinitely accumulated, but they are needless. The only further fact demanding notice is, that we here see still more clearly the truth before pointed out, that in proportion as the area on which any force expends itself becomes heterogeneous, the results are in a yet higher degree multiplied in number and kind. While among the simple tribes to whom it was first known, caoutchouc caused but few changes, among ourselves the changes have been so many and varied that the history of them occupies a volume. Upon the small, homogeneous community inhabiting one of the Hebrides the electric telegraph would produce, were it used, scarcely any results; but in England the results it produces are multitudinous. The comparatively simple organization under which our ancestors lived five centuries ago could have undergone but few modifications from an event like the recent one at Canton; but now the legislative decision respecting it sets up many hundreds of complex modifications, each of which will be the parent of numerous future ones.

Space permitting, we could willingly have pursued the argument in relation to all the subtler results of civilization. As before we showed that the law of progress to which the organic and inorganic worlds conform, is also conformed to by language, the plastic arts, music, etc.; so might we here show that the cause which we have hitherto found to determine progress holds in these cases also. Instances might be given proving how, in science, an advance of one division presently advances other divisions—how astronomy has been immensely forwarded by discoveries in optics, while other optical discoveries have initiated microscopic anatomy and greatly aided the growth of physiology—how

chemistry has indirectly increased our knowledge of electricity, magnetism, biology, geology—how electricity has reacted on chemistry and magnetism, and has developed our views of light and heat. In literature the same truth might be exhibited in the manifold effects of the primitive mystery play, as originating the modern drama, which has variously branched; or in the still multiplying forms of periodical literature which have descended from the first newspaper, and which have severally acted and reacted on other forms of literature and on each other. The influence which a new school of painting—as that of the pre-Raffaelites—exercises upon other schools; the hints which all kinds of pictorial art are deriving from photography; the complex results of new critical doctrines, as those of Mr. Ruskin, might severally be dwelt upon as displaying the like multiplication of effects.

But we venture to think our case is already made out. The imperfections of statement which brevity has necessitated, do not, we believe, invalidate the propositions laid down. The qualifications here and there demanded would not, if made, affect the inferences. Though, in tracing the genesis of progress, we have frequently spoken of complex causes as if they were simple ones; it still remains true that such causes are far less complex than their results. Detailed criticisms do not affect our main position. Endless facts go to show that every kind of progress is from the homogeneous to the heterogeneous; and that it is so because each change is followed by many changes. And it is significant that where the facts are most accessible and abundant, there these truths are most manifest.

However, to avoid committing ourselves to more than is yet proved, we must be content with saying that such are the law and the cause of all progress that is known to us. Should the nebular hypothesis ever be established, then it will become manifest that the universe at large, like every organism, was once homogeneous; that as a whole, and in every detail, it has unceasingly advanced towards greater heterogeneity. It will be seen that as in each event of to-day, so from the beginning, the decomposition of every expended force into several forces has been perpetually producing a higher complication; that the increase of heterogeneity so brought about is still going on and must continue to go on; and that thus progress is not an accident, not a thing within human control, but a beneficent necessity.

A few words must be added on the ontological bearings of our argument. Probably not a few will conclude that here is an attempted

solution of the great questions with which philosophy in all ages has perplexed itself. Let none thus deceive themselves. After all that has been said, the ultimate mystery remains just as it was. The explanation of that which is explicable does but bring out into greater clearness the inexplicableness of that which remains behind. Little as it seems to do so, fearless inquiry tends continually to give a firmer basis to all true religion. The timid sectarian, obliged to abandon one by one the superstitions bequeathed to him, and daily finding his cherished beliefs more and more shaken, secretly fears that all things may some day be explained; and has a corresponding dread of science: thus evincing the profoundest of all infidelity—the fear lest the truth be bad. On the other hand, the sincere man of science, content to follow wherever the evidence leads him, becomes by each new inquiry more profoundly convinced that the universe is an insoluble problem. Alike in the external and the internal worlds, he sees himself in the midst of ceaseless changes, of which he can discover neither beginning nor end. If, tracing back the evolution of things, he allows himself to entertain the hypothesis that all matter once existed in a diffused form, he finds it impossible to conceive how this came to be so; and equally, if he speculates on the future, he can assign no limit to the grand succession of phenomena ever unfolding themselves before him. Similarly, if he looks inward, he perceives that both terminations of the thread of consciousness are beyond his grasp: he cannot remember when or how consciousness commenced, and he cannot examine the consciousness at any moment existing; for only a state of consciousness which is already past can become the object of thought, and never one which is passing. When, again, he turns from the succession of phenomena, external or internal, to their essential nature, he is equally at fault. Though he may succeed in resolving all properties of objects into manifestations of force, he is not thereby enabled to conceive what force is; but finds, on the contrary, that the more he thinks about it the more he is baffled. Similarly, though analysis of mental actions may finally bring him down to sensations as the original materials out of which all thought is woven, he is none the forwarder; for he cannot in the least comprehend sensation. Inward and outward things he thus discovers to be alike inscrutable in their ultimate genesis and nature. He sees that the materialist and spiritualist controversy is a mere war of words; the disputants being equally absurd—each believing he understands that which it is impossible for any man to understand. In all directions his investigations

eventually bring him face to face with the unknowable; and he ever more clearly perceives it to be the unknowable. He learns at once the greatness and the littleness of human intellect—its power in dealing with all that comes within the range of experience; its impotence in dealing with all that transcends experience. He feels more vividly than any others can feel, the incomprehensibleness of the simplest fact, considered in itself. He alone truly *sees* that absolute knowledge is impossible. He alone *knows* that under all things there lies an impenetrable mystery.

CHARLES DARWIN

CHARLES ROBERT DARWIN was born at Shrewsbury, England, Feb. 12, 1809. He was the grandson of Erasmus Darwin. He studied at Edinburgh and Cambridge and was graduated in 1831. He was naturalist on the Beagle during her scientific trip round the world from 1831 to 1836. This voyage developed Darwin from a mere collector into an original investigator, and gave him his first ideas on evolution. In 1838 he read Malthus on the increase of population and this theory became a permanent acquisition to his stock of explanatory principles. His notes show that he began tacitly to assume the principle of natural selection about 1844. He began the "Origin of Species" in that year, but did not finish it until 1859. In 1858 when he had nine or ten chapters done he received a paper from A. R. Wallace then in the Malay Archipelago, advancing the same theory of natural selection. He submitted his work and Wallace's paper to Lyell and Hooker and they decided it would be just to read Wallace's paper and a letter of Darwin's to Asa Grey the same night before the Linnæn Society, which was done July 1, 1858.

This theory showed how evolution could be possible naturally among living organisms. It has changed the whole point of view of the biological sciences. It is probably the most dominant characteristic of the thought of the last century. Darwin's idea, barely stated, is this: Organisms multiply much faster than the means of subsistence; they naturally vary; those variations that are best fitted to the environment survive.

Later, in the "Descent of Man" (1871), this theory was applied to human evolution.

Darwin died Apr. 19, 1882.

NATURAL SELECTION

How will the struggle for existence, briefly discussed in the last chapter, act in regard to variation? Can the principle of selection, which we have seen is so potent in the hands of man, apply under nature? I think we shall see that it can act most efficiently. Let the endless number of slight variations and individual differences occurring in our domestic productions, and, in a lesser degree, in those under nature, be borne in mind; as well as the strength of the hereditary tendency. Under domestication, it may be truly said that the whole organization becomes in some degree plastic. But the variability, which we almost universally meet with in our domestic productions, is not directly produced, as Hooker and Asa Gray have well remarked, by man; he can neither originate varieties, nor prevent their occurrence; he can only preserve and accumulate such as do occur. Unintentionally he exposes organic beings to new and changing conditions of life, and variability ensues; but similar changes of conditions might and do occur under nature. Let it also be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life; and consequently what infinitely varied diversities of structure might be of use to each being under changing conditions of life. Can it then be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should occur in the course of many successive generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigidly destroyed. This preservation of favourable individual differences and variations, and the destruction of those which are injurious, I have called Natural Selection, or the Survival of the Fittest. Variations neither useful nor injurious would not be affected by natural selec-

tion, and would be left either a fluctuating element, as perhaps we see in certain polymorphic species, or would ultimately become fixed, owing to the nature of the organism and the nature of the conditions.

Several writers have misapprehended or objected to the term Natural Selection. Some have even imagined that natural selection induces variability, whereas it implies only the preservation of such variations as arise and are beneficial to the being under its conditions of life. No one objects to agriculturists speaking of the potent effects of man's selection; and in this case the individual differences given by nature, which man for some object selects, must of necessity first occur. Others have objected that the term selection implies conscious choice in the animals which become modified; and it has even been urged that, as plants have no volition, natural selection is not applicable to them! In the literal sense of the word, no doubt, natural selection is a false term; but who ever objected to chemists speaking of the elective affinities of the various elements?—and yet an acid cannot strictly be said to elect the base with which it in preference combines. It has been said that I speak of natural selection as an active power or Deity; but who objects to an author speaking of the attraction of gravity as ruling the movements of the planets? Everyone knows what is meant and is implied by such metaphorical expressions; and they are almost necessary for brevity. So again it is difficult to avoid personifying the word Nature; but I mean by Nature, only the aggregate action and product of many natural laws, and by laws the sequence of events as ascertained by us. With a little familiarity such superficial objections will be forgotten.

We shall best understand the probable course of natural selection by taking the case of a country undergoing some slight physical change, for instance, of climate. The proportional numbers of its inhabitants will almost immediately undergo a change, and some species will probably become extinct. We may conclude, from what we have seen of the intimate and complex manner in which the inhabitants of each country are bound together, that any change in the numerical proportions of the inhabitants, independently of the change of climate itself, would seriously affect the others. If the country were open on its borders, new forms would certainly immigrate, and this would likewise seriously disturb the relations of some of the former inhabitants. Let it be remembered how powerful the influence of a single introduced tree or mammal has been shown to be. But in the case of an island, or of a country partly surrounded by barriers, into which new and better

adapted forms could not freely enter, we should then have places in the economy of nature which would assuredly be better filled up, if some of the original inhabitants were in some manner modified; for, had the area been open to immigration, these same places would have been seized on by intruders. In such cases, slight modifications, which in any way favoured the individuals of any species, by better adapting them to their altered conditions, would tend to be preserved; and natural selection would have free scope for the work of improvement.

We have good reason to believe, as shown in the first chapter, that changes in the conditions of life give a tendency to increased variability; and in the foregoing cases the conditions have changed, and this would manifestly be favourable to natural selection, by affording a better chance of the occurrence of profitable variations. Unless such occur, natural selection can do nothing. Under the term of "variations," it must never be forgotten that mere individual differences are included. As man can produce a great result with his domestic animals and plants by adding up in any given direction individual differences, so could natural selection, but far more easily from having incomparably longer time for action. Nor do I believe that any great physical change, as of climate, or any unusual degree of isolation to check immigration, is necessary in order that new and unoccupied places should be left for natural selection to fill up by improving some of the varying inhabitants. For as all the inhabitants of each country are struggling together with nicely balanced forces, extremely slight modifications in the structure or habits of one species would often give it an advantage over others; and still further modifications of the same kind would often still further increase the advantage, as long as the species continued under the same conditions of life and profited by similar means of subsistence and defense. No country can be named in which all the native inhabitants are now so perfectly adapted to each other and to the physical conditions under which they live, that none of them could be still better adapted or improved; for in all countries, the natives have been so far conquered by naturalized productions, that they have allowed some foreigners to take firm possession of the land. And as foreigners have thus in every country beaten some of the natives, we may safely conclude that the natives might have been modified with advantage, so as to have better resisted the intruders.

As man can produce, and certainly has produced, a great result by his methodical and unconscious means of selection, what may not nat-

ural selection effect? Man can act only on external and visible characters: Nature, if I may be allowed to personify the natural preservation or survival of the fittest, cares nothing for appearances, except in so far as they are useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life. Man selects only for his own good: Nature only for that of the being which she tends. Every selected character is fully exercised by her, as is implied by the fact of their selection. Man keeps the natives of many climates in the same country; he seldom exercises each selected character in some peculiar and fitting manner; he feeds a long and a short-beaked pigeon on the same food; he does not exercise a long-backed or long-legged quadruped in any peculiar manner; he exposes sheep with long and short wool to the same climate. He does not allow the most vigorous males to struggle for the females. He does not rigidly destroy all inferior animals, but protects during each varying season, as far as lies in his power, all his productions. He often begins his selection by some half-monstrous form; or at least by some modification prominent enough to catch the eye or to be plainly useful to him. Under nature, the slightest differences of structure or constitution may well turn the nicely-balanced scale in the struggle for life, and so be preserved. How fleeting are the wishes and efforts of man! how short his time! and consequently how poor will be his results, compared with those accumulated by Nature during whole geological periods! Can we wonder, then, that Nature's productions should be far "truer" in character than man's productions; that they should be infinitely better adapted to the most complex conditions of life, and should plainly bear the stamp of far higher workmanship?

It may metaphorically be said that natural selection is daily and hourly scrutinizing, throughout the world, the slightest variations; rejecting those that are bad, preserving and adding up all that are good; silently and sensibly working, whenever and wherever opportunity offers, at the improvement of each organic being in relation to its organic and inorganic conditions of life. We see nothing of these slow changes in progress, until the hand of time has marked the lapse of ages, and then so imperfect is our view into long-past geological ages, that we see only that the forms of life are now different from what they formerly were.

In order that any great amount of modification should be effected in a species, a variety when once formed must again, perhaps after a long

interval of time, vary or present individual differences of the same favourable nature as before; and these must be again preserved, and so onwards step by step. Seeing that individual differences of the same kind perpetually recur, this can hardly be considered as an unwarrantable assumption. But whether it is true, we can judge only by seeing how far the hypothesis accords with and explains the general phenomena of nature. On the other hand, the ordinary belief that the amount of possible variation is a strictly limited quantity is likewise a simple assumption.

Although natural selection can act only through and for the good of each being, yet characters and structures, which we are apt to consider as of very trifling importance, may thus be acted on. When we see leaf-eating insects green, and bark-feeders mottled gray; the Alpine ptarmigan white in winter, the red-grouse the colour of heather, we must believe that these tints are of service to these birds and insects in preserving them from danger. Grouse, if not destroyed at some period of their lives, would increase in countless numbers; they are known to suffer largely from birds of prey; and hawks are guided by eyesight to their prey—so much so, that on parts of the Continent persons are warned not to keep white pigeons, as being the most liable to destruction. Hence natural selection might be effective in giving the proper colour to each kind of grouse, and in keeping that colour, when once acquired, true and constant. Nor ought we to think that the occasional destruction of an animal of any particular colour would produce little effect: we should remember how essential it is in a flock of white sheep to destroy a lamb with the faintest trace of black. We have seen how the colour of the hogs, which feed on the "paint-root" in Virginia, determines whether they shall live or die. In plants, the down on the fruit and the colour of the flesh are considered by botanists as characters of the most trifling importance: yet we hear from an excellent horticulturist, Downing, that in the United States smooth-skinned fruits suffer far more from a beetle, a Curculio, than those with down; that purple plums suffer far more from a certain disease than yellow plums; whereas another disease attacks yellow-fleshed peaches far more than those with other coloured flesh. If, with all the aids of arts, these slight differences make a great difference in cultivating the several varieties, assuredly, in a state of nature, where the trees would have to struggle with other trees and with a host of enemies, such differences would effectually settle which variety, whether a smooth or downy, a yellow or purple-fleshed fruit, should succeed.

In looking at many small points of difference between species, which, as far as our ignorance permits us to judge, seem quite unimportant, we must not forget that climate, food, etc., have no doubt produced some direct effect. It is also necessary to bear in mind that, owing to the law of correlation, when one part varies, and the variations are accumulated through natural selection, other modifications, often of the most unexpected nature, will ensue.

As we see that those variations which, under domestication, appear at any particular period of life, tend to reappear in the offspring at the same period; for instance, in the shape, size, and flavour of the seeds of the many varieties of our culinary and agricultural plants; in the caterpillar and coccoon stages of the varieties of the silkworm; in the eggs of poultry, and in the colour of the down of their chickens; in the horns of our sheep and cattle when nearly adult; so in a state of nature natural selection will be enabled to act on and modify organic beings at any age, by the accumulation of variations profitable at that age, and by their inheritance at a corresponding age. If it profit a plant to have its seeds more and more widely disseminated by the wind, I can see no greater difficulty in this being effected through natural selection, than in the cotton planter increasing and improving by selection the down in the pods on his cotton trees. Natural selection may modify and adapt the larva of an insect to a score of contingencies, wholly different from those which concern the mature insect; and these modifications may effect, through correlation, the structure of the adult. So, conversely, modifications in the adult may affect the structure of the larva; but in all cases natural selection will insure that they shall not be injurious: for if they were so, the species would become extinct.

Natural selection will modify the structure of the young in relation to the parent, and of the parent in relation to the young. In social animals it will adapt the structure of each individual for the benefit of the whole community; if the community profits by the selected change. What natural selection cannot do, is to modify the structure of one species, without giving it any advantage, for the good of another species; and though statements to this effect may be found in works of natural history, I cannot find one case which will bear investigation. A structure used only once in an animal's life, if of high importance to it, might be modified to any extent by natural selection; for instance, the great jaws possessed by certain insects, used exclusively for opening the cocoon—or the hard tip to the beak of unhatched birds, used

for breaking the egg. It has been asserted, that of the best short-beaked tumbler-pigeons a greater number perish in the egg than are able to get out of it; so that fanciers assist in the act of hatching. Now if nature had to make the beak of a full-grown pigeon very short for the bird's own advantage, the process of modification would be very slow, and there would be simultaneously the most rigorous selection of all the young birds within the egg, which had the most powerful and hardest beaks, for all with weak beaks would inevitably perish; or, more delicate and more easily broken shells might be selected, the thickness of the shell being known to vary like every other structure.

It may be well here to remark that with all beings there must be much fortuitous destruction, which can have little or no influence on the course of natural selection. For instance a vast number of eggs or seeds are annually devoured, and these could be modified through natural selection only if they varied in some manner which protected them from their enemies. Yet many of these eggs or seeds would perhaps, if not destroyed, have yielded individuals better adapted to their conditions of life than any of those which happened to survive. So again a vast number of mature animals and plants, whether or not they be the best adapted to their conditions, must be annually destroyed by accidental causes, which would not be in the least degree mitigated by certain changes of structure or constitution which would in other ways be beneficial to the species. But let the destruction of the adults be ever so heavy, if the number which can exist in any district be not wholly kept down by such causes,—or again let the destruction of eggs or seeds be so great that only a hundredth or a thousandth part are developed,—yet of those which do survive, the best adapted individuals, supposing that there is any variability in a favourable direction, will tend to propagate their kind in larger numbers than the less well adapted. If the numbers be wholly kept down by the causes just indicated, as will often have been the case, natural selection will be powerless in certain beneficial directions; but this is no valid objection to its efficiency at other times and in other ways; for we are far from having any reason to suppose that many species ever undergo modification and improvement at the same time in the same area.

Sexual Selection.

Inasmuch as peculiarities often appear under domestication in one sex and become hereditarily attached to that sex, so no doubt it will be under nature. Thus it is rendered possible for the two sexes to be

modified through natural selection in relation to different habits of life, as is sometimes the case; or for one sex to be modified in relation to the other sex, as commonly occurs. This leads me to say a few words on what I have called Sexual Selection. This form of selection depends, not on a struggle for existence in relation to other organic beings or to external conditions, but on a struggle between the individuals of one sex, generally the males, for the possession of the other sex. The result is not death to the unsuccessful competitor, but few or no offspring. Sexual selection is, therefore, less rigorous than natural selection. Generally, the most vigorous males, those which are best fitted for their places in nature, will leave most progeny. But in many cases, victory depends not so much on general vigour, as on having special weapons, confined to the male sex. A hornless stag or spurless cock would have a poor chance of leaving numerous offspring. Sexual selection, by always allowing the victor to breed, might surely give indomitable courage, length to the spur, and strength to the wing to strike in the spurred leg, in nearly the same manner as does the brutal cockfighter by the careful selection of his best cocks. How low in the scale of nature the law of battle descends, I know not; male alligators have been described as fighting, bellowing, and whirling round, like Indians in a war-dance, for the possession of the females; male salmons have been observed fighting all day long; male stag-beetles sometimes bear wounds from the huge mandibles of other males; the males of certain hymenopterous insects have been frequently seen by that inimitable observer M. Fabre, fighting for a particular female who sits by, an apparently unconcerned beholder of the struggle, and then retires with the conqueror. The war is, perhaps, severest between the males of polygamous animals, and these seem oftenest provided with special weapons. The males of carnivorous animals are already well armed; though to them and to others, special means of defence may be given through means of sexual selection, as the mane of the lion, and the hooked jaw to the male salmon; for the shield may be as important for victory as the sword or spear.

Amongst birds, the contest is often of a more peaceful character. All those who have attended to the subject believe that there is the severest rivalry between the males of many species to attract, by singing, the females. The rock-thrush of Guiana, birds of paradise, and some others, congregate; and successive males display with the most elaborate care, and show off in the best manner, their gorgeous plum-

age; they likewise perform strange antics before the females, which, standing by as spectators, at last choose the most attractive partner. Those who have closely attended to birds in confinement well know that they often take individual preferences and dislikes: thus Sir R. Heron has described how a pied peacock was eminently attractive to all his hen birds. I cannot here enter on the necessary details; but if man can in a short time give beauty and an elegant carriage to his bantams, according to his standard of beauty, I can see no good reason to doubt that female birds, by selecting, during thousands of generations, the most melodious or beautiful males, according to their standard of beauty, might produce a marked effect. Some well-known laws, with respect to the plumage of male and female birds, in comparison with the plumage of the young, can partly be explained through the action of sexual selection on variations occurring at different ages, and transmitted to the males alone or to both sexes at corresponding ages; but I have not space here to enter on this subject.

Thus it is, as I believe, that when the males and females of any animal have the same general habits of life, but differ in structure, colour, or ornament, such differences have been mainly caused by sexual selection: that is, by individual males having had, in successive generations, some slight advantage over other males, in their weapons, means of defence, or charms, which they have transmitted to their male offspring alone. Yet, I would not wish to attribute all sexual differences to this agency: for we see in our domestic animals peculiarities arising and becoming attached to the male sex, which apparently have not been augmented through selection by man. The tuft of hair on the breast of the wild turkey-cock cannot be of any use, and it is doubtful whether it can be ornamental in the eyes of the female bird;—indeed, had the tuft appeared under domestication, it would have been called a monstrosity.

Illustrations of the Action of Natural Selection, or the Survival of the Fittest.

In order to make it clear how, as I believe, natural selection acts, I must beg permission to give one or two imaginary illustrations. Let us take the case of a wolf, which preys on various animals, securing some by craft, some by strength, and some by fleetness; and let us suppose that the fleetest prey, a deer for instance, had from any change in the country increased in numbers, or that other prey had decreased in numbers, during that season of the year when the wolf was hardest pressed for food. Under such circumstances the swiftest and slimmest

wolves would have the best chance of surviving and so be preserved or selected,—provided always that they retained strength to master their prey at this or some other period of the year, when they were compelled to prey on other animals. I can see no more reason to doubt that this would be the result, than that man should be able to improve the fleetness of his greyhounds by careful and methodical selection, or by that kind of unconscious selection which follows from each man trying to keep the best dogs without any thought of modifying the breed. I may add, that, according to Mr. Pierce, there are two varieties of the wolf inhabiting the Catskill Mountains, in the United States, one with a light greyhound-like form, which pursues deer, and the other more bulky, with shorter legs, which more frequently attacks the shepherd's flocks.

It should be observed that, in the above illustration, I speak of the slimmest individual wolves, and not of any single strongly-marked variation having been preserved. In former editions of this work I sometimes spoke as if this latter alternative had frequently occurred. I saw the great importance of individual differences, and this led me fully to discuss the results of unconscious selection by man, which depends on the preservation of all the more or less valuable individuals, and on the destruction of the worst. I saw, also, that the preservation in a state of nature of any occasional deviation of structure, such as a monstrosity, would be a rare event; and that, if at first preserved, it would generally be lost by subsequent intercrossing with ordinary individuals. Nevertheless, until reading an able and valuable article in the "North British Review" (1867), I did not appreciate how rarely single variations, whether slight or strongly-marked, could be perpetuated. The author takes the case of a pair of animals, producing during their lifetime two hundred offspring, of which, from various causes of destruction, only two on an average survive to procreate their kind. This is rather an extreme estimate for most of the higher animals, but by no means so for many of the lower organisms. He then shows that if a single individual were born, which varied in some manner, giving it twice as good a chance of life as that of the other individuals, yet the chances would be strongly against its survival. Supposing it to survive and to breed, and that half its young inherited the favourable variation; still, as the Reviewer goes on to show, the young would have only a slightly better chance of surviving and breeding; and this chance would go on decreasing in the succeeding generations. The justice of these remarks cannot,

I think, be disputed. If, for instance, a bird of some kind could procure its food more easily by having its beak curved, and if one were born with its beak strongly curved, and which consequently flourished, nevertheless there would be a very poor chance of this one individual perpetuating its kind to the exclusion of the common form; but there can hardly be a doubt, judging by what we see taking place under domestication, that this result would follow from the preservation during many generations of a large number of individuals with more or less strongly curved beaks, and from the destruction of a still larger number with the straightest beaks.

It should not, however, be overlooked that certain rather strongly-marked variations, which no one would rank as mere individual differences, frequently recur owing to a similar organization being similarly acted on—of which fact numerous instances could be given with our domestic productions. In such cases, if the varying individual did not actually transmit to its offspring its newly-acquired character, it would undoubtedly transmit to them, as long as the existing conditions remained the same, a still stronger tendency to vary in the same manner. There can also be little doubt that the tendency to vary in the same manner has often been so strong that all the individuals of the same species have been similarly modified without the aid of any form of selection. Or only a third, fifth, or tenth part of the individuals may have been thus affected, of which fact several instances could be given. Thus Graba estimates that about one-fifth of the guillemots in the Faroe Islands consist of a variety so well marked, that it was formerly ranked as a distinct species under the name of Uria lacrymans. In cases of this kind, if the variation were of a beneficial nature, the original form would soon be supplanted by the modified form, through the survival of the fittest.

To the effects of intercrossing in eliminating variations of all kinds, I shall have to recur; but it may be here remarked that most animals and plants keep to their proper homes, and do not needlessly wander about; we see this even with migratory birds, which almost always return to the same spot. Consequently each newly-formed variety would generally be at first local, as seems to be the common rule with varieties in a state of nature; so that similarly modified individuals would soon exist in a small body together, and would often breed together. If the new variety were successful in its battle for life, it would slowly spread from a central district, competing with and con-

quering the unchanged individuals on the margins of an ever-increasing circle.

It may be worth while to give another and more complex illustration of the action of natural selection. Certain plants excrete sweet juice, apparently for the sake of eliminating something injurious from the sap: this is effected, for instance, by glands at the base of the stipules in some Leguminosæ, and at the backs of the leaves of the common laurel. This juice, though small in quantity, is greedily sought by insects; but their visits do not in any way benefit the plant. Now, let us suppose that the juice or nectar was excreted from the inside of the flowers of a certain number of plants of any species. Insects in seeking the nectar would get dusted with pollen, and would often transport it from one flower to another. The flowers of two distinct individuals of the same species would thus get crossed; and the act of crossing, as can be fully proved, gives rise to vigorous seedlings, which consequently would have the best chance of flourishing and surviving. The plants which produced flowers with the largest glands or nectaries, excreting most nectar, would oftenest be visited by insects, and would oftenest be crossed; and so in the long-run would gain the upper hand and form a local variety. The flowers, also, which had their stamens and pistils placed, in relation to the size and habits of the particular insect which visited them, so as to favour in any degree the transportal of the pollen, would likewise be favoured. We might have taken the case of insects visiting flowers for the sake of collecting pollen instead of nectar; and as pollen is formed for the sole purpose of fertilisation, its destruction appears to be a simple loss to the plant; yet if a little pollen were carried, at first occasionally and then habitually, by the pollen-devouring insects from flower to flower, and a cross thus effected, although nine-tenths of the pollen were destroyed it might still be a great gain to the plant to be thus robbed; and the individuals which produced more and more pollen, and had larger anthers, would be selected.

When our plant, by the above process long continued, had been rendered highly attractive to insects, they would, unintentionally on their part, regularly carry pollen from flower to flower; and that they do this effectually, I could easily show by many striking facts. I will give only one, as likewise illustrating one step in the separation of the sexes of plants. Some holly-trees bear only male flowers, which have four stamens producing a rather small quantity of pollen, and a rudi-

mentary pistil; other holly-trees bear only female flowers; these have a full-sized pistil, and four stamens with shrivelled anthers, in which not a grain of pollen can be detected. Having found a female tree exactly sixty yards from a male tree, I put the stigmas of twenty flowers, taken from different branches, under the microscope, and on all, without exception, there were a few pollen-grains, and on some a profusion. As the wind had set for several days from the female to the male tree, the pollen could not thus have been carried. The weather had been cold and boisterous, and therefore not favourable to bees, nevertheless every female flower which I examined had been effectually fertilised by the bees, which had flown from tree to tree in search of nectar. But to return to our imaginary case: as soon as the plant had been rendered so highly attractive to insects that pollen was regularly carried from flower to flower, another process might commence. No naturalist doubts the advantage of what has been called the "physiological division of labour;" hence we may believe that it would be advantageous to a plant to produce stamens alone in one flower or on one whole plant, and pistils alone in another flower or on another plant. In plants under culture and placed under new conditions of life, sometimes the male organs and sometimes the female organs become more or less impotent; now if we suppose this to occur in ever so slight a degree under nature, then, as pollen is already carried regularly from flower to flower, and as a more complete separation of the sexes of our plant would be advantageous on the principle of the division of labour, individuals with this tendency more and more increased, would be continually favoured or selected, until at last a complete separation of the sexes might be effected. It would take up too much space to show the various steps, through dimorphism and other means, by which the separation of the sexes in plants of various kinds is apparently now in progress; but I may add that some of the species of holly in North America, are, according to Asa Gray, in an exactly intermediate condition, or, as he expresses it, are more or less dicœciously polygamous.

Let us now turn to the nectar-feeding insects; we may suppose the plant, of which we have been slowly increasing the nectar by continued selection, to be a common plant; and that certain insects depended in main part on its nectar for food. I could give many facts showing how anxious bees are to save time: for instance, their habit of cutting holes and sucking the nectar at the bases of certain flowers, which with a

very little more trouble, they can enter by the mouth. Bearing such facts in mind, it may be believed that under certain circumstances individual differences in the curvature or length of the proboscis, &c., too slight to be appreciated by us, might profit a bee or other insect, so that certain individuals would be able to obtain their food more quickly than others; and thus the communities to which they belonged would flourish and throw off many swarms inheriting the same peculiarities. The tubes of the corolla of the common red and incarnate clovers (Trifolium pratense and incarnatum) do not on a hasty glance appear to differ in length; yet the hive-bee can easily suck the nectar out of the incarnate clover, but not out of the common red clover, which is visited by humble-bees alone; so that whole fields of the red clover offer in vain an abundant supply of precious nectar to the hive-bee. That this nectar is much liked by the hive-bee is certain; for I have repeatedly seen, but only in the autumn, many hive-bees sucking the flowers through holes bitten in the base of the tube by humble-bees. The difference in the length of the corolla in the two kinds of clover, which determines the visits of the hive-bee, must be very trifling; for I have been assured that when red clover has been mown, the flowers of the second crop are somewhat smaller, and that these are visited by many hive-bees. I do not know whether this statement is accurate; nor whether another published statement can be trusted, namely, that the Ligurian bee, which is generally considered a mere variety of the common hive-bee, and which freely crosses with it, is able to reach and suck the nectar of the red clover. Thus, in a country where this kind of clover abounded, it might be a great advantage to the hive-bee to have a slightly longer or differently constructed proboscis. On the other hand, as the fertility of this clover absolutely depends on bees visiting the flowers, if humble-bees were to become rare in any country, it might be a great advantage to the plant to have a shorter or more deeply divided corolla, so that the hive-bees should be enabled to suck its flowers. Thus I can understand how a flower and a bee might slowly become, either simultaneously or one after the other, modified and adapted to each other in the most perfect manner, by the continued preservation of all the individuals which presented slight deviations of structure mutually favourable to each other.

I am well aware that this doctrine of natural selection, exemplified in the above imaginary instances, is open to the same objections which were first urged against Sir Charles Lyell's noble views on "the modern

changes of the earth, as illustrative of geology;" but we now seldom hear the agencies which we see still at work, spoken of as trifling or insignificant, when used in explaining the excavation of the deepest valleys or the formation of long lines of inland cliffs. Natural selection acts only by the preservation and accumulation of small inherited modifications, each profitable to the preserved being; and as modern geology has almost banished such views as the excavation of a great valley by a single diluvial wave, so will natural selection banish the belief of the continued creation of new organic beings, or of any great and sudden modification in their structure.

On the Intercrossing of Individuals.

I must here introduce a short digression. In the case of animals and plants with separated sexes, it is of course obvious that two individuals must always (with the exception of the curious and not well understood cases of parthenogenesis) unite for each birth; but in the case of hermaphrodites this is far from obvious. Nevertheless there is reason to believe that with all hermaphrodites two individuals, either occasionally or habitually, concur for the reproduction of their kind. This view was long ago doubtfully suggested by Sprengel, Knight and Kölreuter. We shall presently see its importance; but I must here treat the subject with extreme brevity, though I have the materials prepared for an ample discussion. All vertebrate animals, all insects, and some other large groups of animals, pair for each birth. Modern research has much diminished the number of supposed hermaphrodites, and of real hermaphrodites a large number pair; that is, two individuals regularly unite for reproduction, which is all that concerns us. But still there are many hermaphrodite animals which certainly do not habitually pair, and a vast majority of plants are hermaphrodites. What reason, it may be asked, is there for supposing in these cases that two individuals ever concur in reproduction? As it is impossible here to enter on details, I must trust to some general considerations alone.

In the first place, I have collected so large a body of facts, and made so many experiments, showing, in accordance with the almost universal belief of breeders, that with animals and plants a cross between different varieties, or between individuals of the same variety but of another strain, gives vigour and fertility to the offspring; and on the other hand, that close interbreeding diminishes vigour and fertility; that these facts alone incline me to believe that it is a general law of nature that no organic being fertilises itself for a perpetuity of gen-

erations; but that a cross with another individual is occasionally—perhaps at long intervals of time—indispensable.

On the belief that this is a law of nature, we can, I think, understand several large classes of facts, such as the following, which on any other view are inexplicable. Every hybridizer knows how unfavourable exposure to wet is to the fertilisation of a flower, yet what a multitude of flowers have their anthers and stigmas fully exposed to the weather! If an occasional cross be indispensable, notwithstanding that the plant's own anthers and pistil stand so near each other as almost to insure self-fertilisation, the fullest freedom for the entrance of pollen from another individual will explain the above state of exposure of the organs. Many flowers, on the other hand, have their organs of fructification closely enclosed, as in the great papilionaceous or pea-family; but these almost invariably present beautiful and curious adaptations in relation to the visits of insects. So necessary are the visits of bees to many papilionaceous flowers, that their fertility is greatly diminished if these visits be prevented. Now, it is scarcely possible for insects to fly from flower to flower, and not to carry pollen from one to the other, to the great good of the plant. Insects act like a camel-hair pencil, and it is sufficient, to ensure fertilisation, just to touch with the same brush the anthers of one flower and then the stigma of another; but it must not be supposed that bees would thus produce a multitude of hybrids between distinct species; for if a plant's own pollen and that from another species are placed on the same stigma, the former is so prepotent that it invariably and completely destroys, as has been shown by Gärtner, the influence of the foreign pollen.

When the stamens of a flower suddenly spring towards the pistil, or slowly move one after the other towards it, the contrivance seems adapted solely to ensure self-fertilisation; and no doubt it is useful for this end: but the agency of insects is often required to cause the stamens to spring forward, as Kölreuter has shown to be the case with the barberry; and in this very genus, which seems to have a special contrivance for self-fertilisation, it is well known that, if closely-allied forms or varieties are planted near each other, it is hardly possible to raise pure seedlings, so largely do they naturally cross. In numerous other cases, far from self-fertilisation being favoured, there are special contrivances which effectually prevent the stigma receiving pollen from its own flower, as I could show from the works of Sprengel and others, as well as from my own observations: for instance, in Lobelia fulgens,

there is a really beautiful and elaborate contrivance by which all the infinitely numerous pollen-granules are swept out of the conjoined anthers of each flower, before the stigma of that individual flower is ready to receive them; and as this flower is never visited, at least in my garden, by insects, it never sets a seed, though by placing pollen from one flower on the stigma of another, I raise plenty of seedlings. Another species of Lobelia, which is visited by bees, seeds freely in my garden. In very many other cases, though there is no special mechanical contrivance to prevent the stigma receiving pollen from the same flower, yet, as Sprengel, and more recently Hildebrand, and others, have shown, and as I can confirm, either the anthers burst before the stigma is ready for fertilisation, or the stigma is ready before the pollen of that flower is ready, so that these so-named dichogamous plants have in fact separated sexes, and must habitually be crossed. So it is with the reciprocally dimorphic and trimorphic plants previously alluded to. How strange are these facts! How strange that the pollen and stigmatic surface of the same flower, though placed so close together, as if for the very purpose of self-fertilisation, should be in so many cases mutually useless to each other! How simply are these facts explained on the view of an occasional cross with a distinct individual being advantageous or indispensable!

If several varieties of the cabbage, radish, onion, and of some other plants, be allowed to seed near each other, a large majority of the seedlings thus raised turn out, as I have found, mongrels: for instance, I raised 233 seedling cabbages from some plants of different varieties growing near each other, and of these only 78 were true to their kind, and some even of these were not perfectly true. Yet the pistil of each cabbage-flower is surrounded not only by its own six stamens but by those of the many other flowers on the same plant; and the pollen of each flower readily gets on its own stigma without insect agency; for I have found that plants carefully protected from insects produce the full number of pods. How, then, comes it that such a vast number of the seedlings are mongrelized? It must arise from the pollen of a distinct variety having a prepotent effect over the flower's own pollen; and that this is part of the general law of good being derived from the intercrossing of distinct individuals of the same species. When distinct species are crossed the case is reversed, for a plant's own pollen is almost always prepotent over foreign pollen; but to this subject we shall return in a future chapter.

In the case of a large tree covered with innumerable flowers, it may be objected that pollen could seldom be carried from tree to tree, and at most only from flower to flower on the same tree; and flowers on the same tree can be considered as distinct individuals only in a limited sense. I believe this objection to be valid, but that nature has largely provided against it by giving to trees a strong tendency to bear flowers with separated sexes. When the sexes are separated, although the male and female flowers may be produced on the same tree, pollen must be regularly carried from flower to flower; and this will give a better chance of pollen being occasionally carried from tree to tree. That trees belonging to all Orders have their sexes more often separated than other plants, I find to be the case in this country; and at my request Dr. Hooker tabulated the trees of New Zealand, and Dr. Asa Gray those of the United States, and the result was as I anticipated. On the other hand, Dr. Hooker informs me that the rule does not hold good in Australia; but if most of the Australian trees are dichogamous, the same result would follow as if they bore flowers with separated sexes. I have made these few remarks on trees simply to call attention to the subject.

Turning for a brief space to animals: various terrestrial species are hermaphrodites, such as the land-mollusca and earth-worms; but these all pair. As yet I have not found a single terrestrial animal which can fertilise itself. This remarkable fact, which offers so strong a contrast with terrestrial plants, is intelligible on the view of an occasional cross being indispensable; for owing to the nature of the fertilising element there are no means, analogous to the action of insects and of the wind with plants, by which an occasional cross could be effected with terrestrial animals without the concurrence of two individuals. Of aquatic animals, there are many self-fertilising hermaphrodites; but here the currents of water offer an obvious means for an occasional cross. As in the case of flowers, I have as yet failed, after consultation with one of the highest authorities, namely, Professor Huxley, to discover a single hermaphrodite animal with the organs of reproduction so perfectly enclosed that access from without, and the occasional influence of a distinct individual, can be shown to be physically impossible. Cirripedes long appeared to me to present, under this point of view, a case of great difficulty; but I have been enabled, by a fortunate chance, to prove that two individuals, though both are self-fertilising hermaphrodites, do sometimes cross.

It must have struck most naturalists as a strange anomaly that, both with animals and plants, some species of the same family and even of the same genus, though agreeing closely with each other in their whole organisation, are hermaphrodites, and some unisexual. But if, in fact, all hermaphrodites do occasionally intercross, the difference between them and unisexual species is, as far as function is concerned, very small.

From these several considerations and from the many special facts which I have collected, but which I am unable here to give, it appears that with animals and plants an occasional intercross between distinct individuals is a very general, if not universal, law of nature.

Circumstances favourable for the production of new forms through Natural Selection.

This is an extremely intricate subject. A great amount of variability, under which term individual differences are always included, will evidently be favourable. A large number of individuals by giving a better chance within any given period for the appearance of profitable variations, will compensate for a lesser amount of variability in each individual, and is, I believe, a highly important element of success. Though Nature grants long periods of time for the work of natural selection, she does not grant an indefinite period; for as all organic beings are striving to seize on each place in the economy of nature, if any one species does not become modified and improved in a corresponding degree with its competitors, it will be exterminated. Unless favourable variations be inherited by some at least of the offspring, nothing can be effected by natural selection. The tendency to reversion may often check or prevent the work; but as this tendency has not prevented man from forming by selection numerous domestic races, why should it prevail against natural selection?

In the case of methodical selection, a breeder selects for some definite object, and if the individuals be allowed freely to intercross, his work will completely fail. But when many men, without intending to alter the breed, have a nearly common standard of perfection, and all try to procure and breed from the best animals, improvement surely but slowly follows from this unconscious process of selection, notwithstanding that there is no separation of selected individuals. Thus it will be under nature; for within a confined area, with some place in the natural polity not perfectly occupied, all the individuals varying in the right direction, though in different degrees, will tend to be preserved. But if

the area be large, its several districts will almost certainly present different conditions of life; and then, if the same species undergoes modification in different districts, the newly-formed varieties will intercross on the confines of each. But we shall see in the sixth chapter that intermediate varieties, inhabiting intermediate districts, will in the long run generally be supplanted by one of the adjoining varieties. Intercrossing will chiefly affect those animals which unite for each birth and wander much, and which do not breed at a very quick rate. Hence with animals of this nature, for instance, birds, varieties will generally be confined to separated countries; and this I find to be the case. With hermaphrodite organisms which cross only occasionally, and likewise with animals which unite for each birth, but which wander little and can increase at a rapid rate, a new and improved variety might be quickly formed on any one spot, and might there maintain itself in a body and afterwards spread, so that the individuals of the new variety would chiefly cross together. On this principle, nurserymen always prefer saving seed from a large body of plants, as the chance of intercrossing is thus lessened.

Even with animals which unite for each birth, and which do not propagate rapidly, we must not assume that free intercrossing would always eliminate the effects of natural selection; for I can bring forward a considerable body of facts showing that within the same area two varieties of the same animal may long remain distinct, from haunting different stations, from breeding at slightly different seasons, or from the individuals of each variety preferring to pair together.

Intercrossing plays a very important part in nature by keeping the individuals of the same species, or of the same variety, true and uniform in character. It will obviously thus act far more efficiently with those animals which unite for each birth; but, as already stated, we have reason to believe that occasional intercrosses take place with all animals and plants. Even if these take place only at long intervals of time, the young thus produced will gain so much in vigour and fertility over the offspring from long-continued self-fertilization, that they will have a better chance of surviving and propagating their kind; and thus in the long run the influence of crosses, even at rare intervals, will be great. With respect to organic beings extremely low in the scale, which do not propagate sexually, nor conjugate, and which cannot possibly intercross, uniformity of character can be retained by them under the same conditions of life, only through the principle of inheritance, and through

natural selection which will destroy any individuals departing from the proper type. If the conditions of life change and the form undergoes modification, uniformity of character can be given to the modified offspring, solely by natural selection preserving similar favourable variations.

Isolation, also, is an important element in the modification of species through natural selection. In a confined or isolated area, if not very large, the organic and inorganic conditions of life will generally be almost uniform; so that natural selection will tend to modify all the varying individuals of the same species in the same manner. Intercrossing with the inhabitants of the surrounding districts will also be thus prevented. Moritz Wagner has lately published an interesting essay on this subject, and has shown that the service rendered by isolation in preventing crosses between newly-formed varieties is probably greater even than I supposed. But from reasons already assigned I can by no means agree with this naturalist, that migration and isolation are necessary elements for the formation of new species. The importance of isolation is likewise great in preventing, after any physical change in the conditions, such as climate, elevation of the land, etc., the immigration of better adapted organisms; and thus new places in the natural economy of the district will be left open to be filled up by the modification of the old inhabitants. Lastly, isolation will give time for a new variety to be improved at a slow rate; and this may sometimes be of much importance. If, however, an isolated area be very small, either from being surrounded by barriers, or from having very peculiar physical conditions, the total number of the inhabitants will be small; and this will retard the production of new species through natural selection, by decreasing the chances of favourable variations arising.

The mere lapse of time by itself does nothing, either for or against natural selection. I state this because it has been erroneously stated that the element of time has been assumed by me to play an all-important part in modifying species, as if all the forms of life were necessarily undergoing change through some innate law. Lapse of time is only so far important, and its importance in this respect is great, that it gives a better chance of beneficial variations arising and of their being selected, accumulated, and fixed. It likewise tends to increase the direct action of the physical conditions of life, in relation to the constitution of each organism.

If we turn to nature to test the truth of these remarks, and look at

any small isolated area, such as an oceanic island, although the number of species inhabiting it is small, as we shall see in our chapter on Geographical Distribution; yet of these species a very large proportion are endemic—that is, have been produced there and nowhere else in the world. Hence an oceanic island at first sight seems to have been highly favourable for the production of new species. But we may thus deceive ourselves, for to ascertain whether a small isolated area, or a large open area like a continent, has been most favourable for the production of new organic forms, we ought to make the comparison within equal times; and this we are incapable of doing.

Although isolation is of great importance in the production of new species, on the whole I am inclined to believe that largeness of area is still more important, especially for the production of species which shall prove capable of enduring for a long period, and of spreading widely. Throughout a great and open area, not only will there be a better chance of favourable variations, arising from the large number of individuals of the same species there supported, but the conditions of life are much more complex from the large number of already existing species; and if some of these many species become modified and improved, others will have to be improved in a corresponding degree, or they will be exterminated. Each new form, also, as soon as it has been much improved, will be able to spread over the open and continuous area, and will thus come into competition with many other forms. Moreover, great areas, though now continuous, will often, owing to former oscillations of level, have existed in a broken condition; so that the good effects of isolation will generally, to a certain extent, have concurred. Finally, I conclude that, although small isolated areas have been in some respects highly favourable for the production of new species, yet that the course of modification will generally have been more rapid on large areas; and what is more important, that the new forms produced on large areas, which already have been victorious over many competitors, will be those that will spread most widely, and will give rise to the greatest number of new varieties and species. They will thus play a more important part in the changing history of the organic world.

In accordance with this view, we can, perhaps, understand some facts which will be again alluded to in our chapter on Geographical Distribution; for instance, the fact of the productions of the smaller continent of Australia now yielding before those of the larger Europæo-Asiatic area. Thus, also, it is that continental productions have

everywhere become so largely naturalized on islands. On a small island, the race for life will have been less severe, and there will have been less modification and less extermination. Hence, we can understand how it is that the flora of Madeira, according to Oswald Heer, resembles to a certain extent the extinct tertiary flora of Europe. All fresh-water basins, taken together, make a small area compared with that of the sea or of the land. Consequently the competition between fresh-water productions will have been less severe than elsewhere; new forms will have been then more slowly produced, and old forms more slowly exterminated. And it is in fresh-water basins that we find seven genera of Ganoid fishes, remnants of a once preponderant order: and in fresh water we find some of the most anomalous forms now known in the world as the Ornithorhynchus and Lepido-siren, which, like fossils, connect to a certain extent orders at present widely sundered in the natural scale. These anomalous forms may be called living fossils; they have endured to the present day, from having inhabited a confined area, and from having been exposed to less varied, and therefore less severe, competition.

To sum up, as far as the extreme intricacy of the subject permits, the circumstances favourable and unfavourable for the production of new species through natural selection. I conclude that for terrestrial productions a large continental area, which has undergone many oscillations of level, will have been the most favourable for the production of many new forms of life, fitted to endure for a long time and to spread widely. Whilst the area existed as a continent, the inhabitants will have been numerous in individuals and kinds, and will have been subjected to severe competition. When converted by subsidence into large separate islands, there will still have existed many individuals of the same species on each island: intercrossing on the confines of the range of each new species will have been checked; after physical changes of any kind, immigration will have been prevented, so that new places in the polity of each island will have had to be filled up by the modification of the old inhabitants; and time will have been allowed for the varieties in each to become well modified and perfected. When, by renewed elevation, the islands were reconverted into a continental area, there will again have been very severe competition: the most favoured or improved varieties will have been enabled to spread: there will have been much extinction of the less improved forms, and the relative proportional numbers of the various inhabitants of the reunited continent will again have been

changed; and again there will have been a fair field for natural selection to improve still further the inhabitants, and thus to produce new species.

That natural selection generally acts with extreme slowness I fully admit. It can act only when there are places in the natural polity of a district which can be better occupied by the modification of some of its existing inhabitants. The occurrence of such places will often depend on physical changes, which generally take place very slowly, and on the immigration of better adapted forms being prevented. As some few of the old inhabitants become modified, the mutual relations of others will often be disturbed; and this will create new places, ready to be filled up by better adapted forms; but all this will take place very slowly. Although all the individuals of the same species differ in some slight degree from each other, it would often be long before differences of the right nature in various parts of the organization might occur. The result would often be greatly retarded by free intercrossing. Many will exclaim that these several causes are amply sufficient to neutralize the power of natural selection. I do not believe so. But I do believe that natural selection will generally act very slowly, only at long intervals of time, and only on a few of the inhabitants of the same region. I further believe that these slow, intermittent results accord well with what geology tells us of the rate and manner at which the inhabitants of the world have changed.

Slow though the process of selection may be, if feeble man can do much by artificial selection, I can see no limit to the amount of change, to the beauty and complexity of the coadaptations between all organic beings, one with another and with their physical conditions of life, which may have been affected in the long course of time through nature's power of selection, that is, by the survival of the fittest.

Extinction caused by Natural Selection.

This subject will be more fully discussed in our chapter on Geology; but it must here be alluded to from being intimately connected with natural selection. Natural selection acts solely through the preservation of variations in some way advantageous, which consequently endure. Owing to the high geometrical rate of increase of all organic beings, each area is already fully stocked with inhabitants; and it follows from this, that as the favoured forms increase in number, so, generally, will the less favoured decrease and become rare. Rarity, as geology tells us, is the precursor to extinction. We can see that any form which is represented by few individuals will run a good chance of utter extinction,

during great fluctuations in the nature of the seasons, or from a temporary increase in the number of its enemies. But we may go further than this; for, as new forms are produced, unless we admit that specific forms can go on indefinitely increasing in number, many old forms must become extinct. That the number of specific forms has not indefinitely increased, geology plainly tells us; and we shall presently attempt to show why it is that the number of species throughout the world has not become immeasurably great.

We have seen that the species which are most numerous in individuals have the best chance of producing favourable variations within any given period. We have evidence of this, in the facts stated in the second chapter, showing that it is the common and diffused or dominant species which offer the greatest number of recorded varieties. Hence, rare species will be less quickly modified or improved within any given period; they will consequently be beaten in the race for life by the modified and improved descendants of the commoner species.

From these several considerations I think it inevitably follows that, as new species in the course of time are formed through natural selection, others will become rarer and rarer, and finally extinct. The forms which stand in closest competition with those undergoing modification and improvement, will naturally suffer most. And we have seen in the chapter on the Struggle for Existence that it is the most closely-allied forms—varieties of the same species, and species of the same genus or of related genera—which, from having nearly the same structure, constitution, and habits, generally come into the severest competition with each other; consequently, each new variety or species, during the progress of its formation, will generally press hardest on its nearest kindred, and tend to exterminate them. We see the same process of extermination amongst our domesticated productions, through the selection of improved forms by man. Many curious instances could be given showing how quickly new breeds of cattle, sheep and other animals, and varieties of flowers, take the place of older and inferior kinds. In Yorkshire, it is historically known that the ancient black cattle were displaced by the long-horns, and that these "were swept away by the short-horns" (I quote the words of an agricultural writer) "as if by some murderous pestilence."

Divergence of Character.

The principle, which I have designated by this term, is of high importance, and explains, as I believe, several important facts. In the

first place, varieties, even strongly-marked ones, though having somewhat of the character of species—as is shown by the hopeless doubts in many cases how to rank them—yet certainly differ far less from each other than do good and distinct species. Nevertheless, according to my view, varieties are species in the process of formation, or are, as I have called them, incipient species. How, then, does the lesser difference between varieties become augmented into the greater difference between species? That this does habitually happen, we must infer from most of the innumerable species throughout nature presenting well-marked differences; whereas varieties, the supposed prototypes and parents of future well-marked species, present slight and ill-defined differences. Mere chance, as we may call it, might cause one variety to differ in some character from its parents, and the offspring of this variety again to differ from its parent in the very same character and in a greater degree; but this alone would never account for so habitual and large a degree of difference as that between the species of the same genus.

As has always been my practice, I have sought light on this head from our domestic productions. We shall here find something analogous. It will be admitted that the production of races so different as short-horn and Hereford cattle, race and cart horses, the several breeds of pigeons, etc., could never have been effected by the mere chance accumulation of similar variations during many successive generations. In practice, a fancier is, for instance, struck by a pigeon having a slightly shorter beak; another fancier is struck by a pigeon having a rather longer beak; and on the acknowledged principle that "fanciers do not and will not admire a medium standard, but like extremes," they both go on (as has actually occurred with the sub-breeds of the tumbler-pigeon) choosing and breeding from birds with longer and longer beaks, or with shorter and shorter beaks. Again, we may suppose that at an early period of history, the men of one nation or district required swifter horses, whilst those of another required stronger and bulkier horses. The early differences would be very slight; but, in the course of time, from the continued selection of swifter horses in the one case, and of stronger ones in the other, the differences would become greater, and would be noted as forming two sub-breeds. Ultimately, after the lapse of centuries, these sub-breeds would become converted into two well-established and distinct breeds. As the differences became greater, the inferior animals with intermediate characters, being neither very swift nor very strong, would not have been used for breeding, and will thus

have tended to disappear. Here, then, we see in man's productions the action of what may be called the principle of divergence, causing differences, at first barely appreciable, steadily to increase, and the breeds to diverge in character, both from each other and from their common parent.

But how, it may be asked, can any analogous principle apply in nature? I believe it can and does apply most efficiently (though it was a long time before I saw how), from the simple circumstance that the more diversified the descendants from any one species become in structure, constitution, and habits, by so much will they be better enabled to seize on many and widely diversified places in the polity of nature, and so be enabled to increase in numbers.

We can clearly discern this in the case of animals with simple habits. Take the case of a carnivorous quadruped, of which the number that can be supported in any country has long ago arrived at its full average. If its natural power of increase be allowed to act, it can succeed in increasing (the country not undergoing any change in conditions) only by its varying descendants seizing on places at present occupied by other animals: some of them, for instance, being enabled to feed on new kinds of prey, either dead or alive; some inhabiting new stations, climbing trees, frequenting water, and some perhaps becoming less carnivorous. The more diversified in habits and structure the descendants of our carnivorous animals become, the more places they will be enabled to occupy. What applies to one animal will apply throughout all time to all animals—that is, if they vary—for otherwise natural selection can effect nothing. So it will be with plants. It has been experimentally proved, that if a plot of ground be sown with one species of grass, and a similar plot be sown with several distinct genera of grasses, a greater number of plants and a greater weight of dry herbage can be raised in the latter than in the former case. The same has been found to hold good when one variety and several mixed varieties of wheat have been sown on equal spaces of ground. Hence, if any one species of grass were to go on varying, and the varieties were continually selected which differed from each other in the same manner, though in a very slight degree, as do the distinct species and genera of grasses, a greater number of individual plants of this species, including its modified descendants, would succeed in living on the same piece of ground. And we know that each species and each variety of grass is annually sowing almost countless seeds; and is thus striving, as it may be said, to

the utmost to increase in number. Consequently, in the course of many thousand generations, the most distinct varieties of any one species of grass would have the best chance of succeeding and of increasing in numbers, and thus of supplanting the less distinct varieties; and varieties, when rendered very distinct from each other, take the rank of species.

The truth of the principle that the greatest amount of life can be supported by great diversification of structure, is seen under many natural circumstances. In an extremely small area, especially if freely open to immigration, and where the contest between individual and individual must be very severe, we always find great diversity in its inhabitants. For instance, I found that a piece of turf, three feet by four in size, which had been exposed for many years to exactly the same conditions, supported twenty species of plants, and these belonged to eighteen genera and to eight orders, which shows how much these plants differed from each other. So it is with the plants and insects on small and uniform islets: also in small ponds of fresh water. Farmers find that they can raise most food by a rotation of plants belonging to the most different orders: nature follows what may be called a simultaneous rotation. Most of the animals and plants which live close round any small piece of ground, could live on it (supposing its nature not to be in any way peculiar), and may be said to be striving to the utmost to live there; but it is seen that where they come into the closest competition, the advantages of diversification of structure, with the accompanying differences of habit and constitution, determine that the inhabitants, which thus jostle each other most closely, shall, as a general rule, belong to what we call different genera and orders.

The same principle is seen in the naturalization of plants through man's agency in foreign lands. It might have been expected that the plants which would succeed in becoming naturalized in any land would generally have been closely allied to the indigenes; for these are commonly looked at as specially created and adapted for their own country. It might also, perhaps, have been expected that naturalized plants would have belonged to a few groups more especially adapted to certain stations in their new homes. But the case is very different; and Alph. de Candolle has well remarked, in his great and admirable work, that floras gain by naturalization, proportionally with the number of the native genera and species, far more in new genera than in new species. To give a single instance: in the last edition of Dr. Asa Gray's "Manual of

the Flora of the Northern United States," 260 naturalized plants are enumerated, and these belong to 162 genera. We thus see that these naturalized plants are of a highly diversified nature. They differ, moreover, to a large extent, from the indigenes, for out of the 162 naturalized genera, no less than 100 genera are not there indigenous, and thus a large proportional addition is made to the genera now living in the United States.

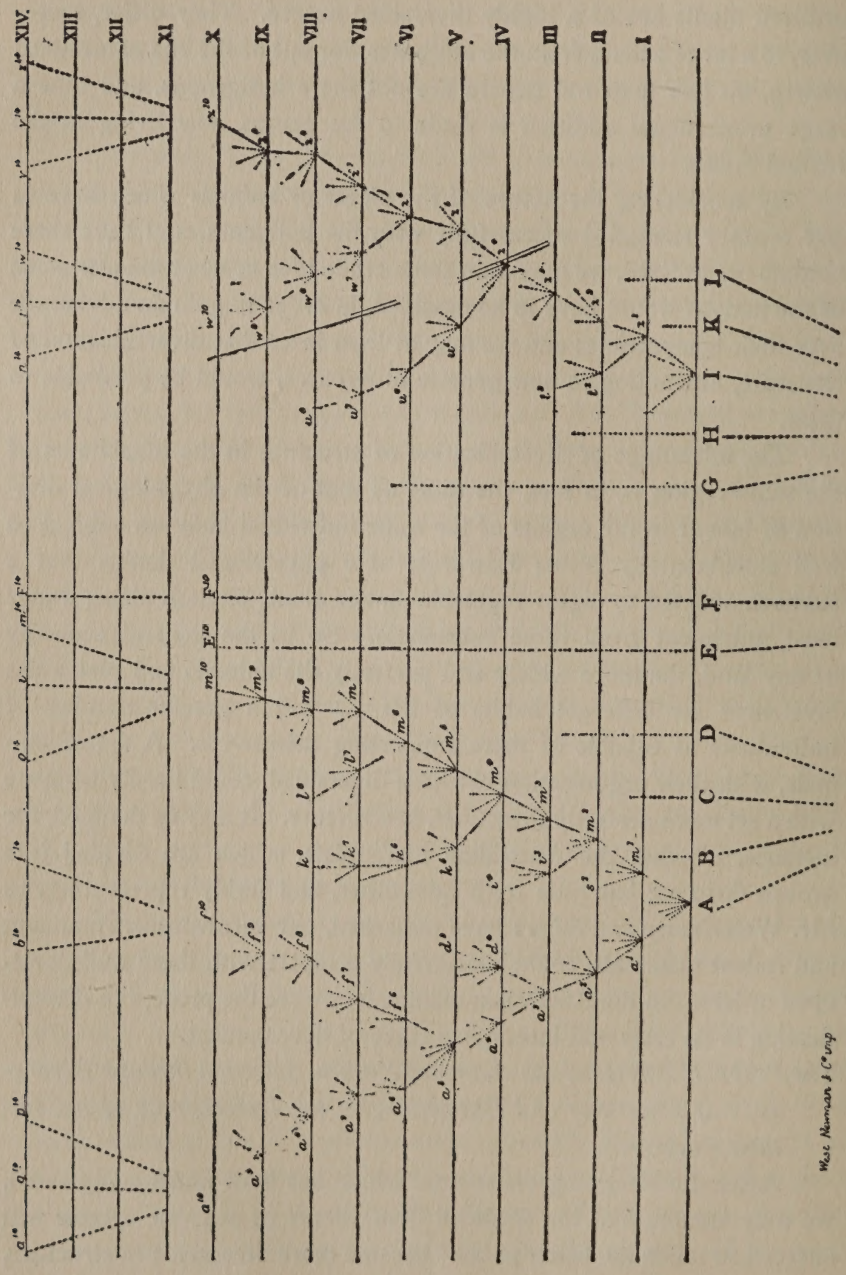
By considering the nature of the plants or animals which have in any country struggled successfully with the indigenes, and have there become naturalized, we may gain some crude idea in what manner some of the natives would have to be modified, in order to gain an advantage over their compatriots; and we may at least infer that diversification of structure, amounting to new generic differences, would be profitable to them.

The advantage of diversification of structure in the inhabitants of the same region is, in fact, the same as that of the physiological division of labour in the organs of the same individual body—a subject so well elucidated by Milne Edwards. No physiologist doubts that a stomach adapted to digest vegetable matter alone, or flesh alone, draws most nutriment from these substances. So in the general economy of any land, the more widely and perfectly the animals and plants are diversified for different habits of life, so will a greater number of individuals be capable of there supporting themselves. A set of animals, with their organization but little diversified, could hardly compete with a set more perfectly diversified in structure. It may be doubted, for instance, whether the Australian marsupials, which are divided into groups differing but little from each other, and feebly representing, as Mr. Waterhouse and others have remarked, our carnivorous, ruminant, and rodent mammals, could successfully compete with these well-developed orders. In the Australian mammals, we see the process of diversification in an early and incomplete stage of development.

The Probable Effects of the Action of Natural Selection through Divergence of Character and Extinction, on the Descendants of a Common Ancestor.

After the foregoing discussion, which has been much compressed, we may assume that the modified descendants of any one species will succeed so much the better as they become more diversified in structure, and are thus enabled to encroach on places occupied by other beings. Now let us see how this principle of benefit being derived from diverg-

ence of character, combined with the principles of natural selection and of extinction, tends to act.



The accompanying diagram will aid us in understanding this rather perplexing subject. Let A to L represent the species of a genus large

in its own country; these species are supposed to resemble each other in unequal degrees, as is so generally the case in nature, and as is represented in the diagram by the letters standing at unequal distances. I have said a large genus, because as we saw in the second chapter, on an average more species vary in large genera than in small genera; and the varying species of the large genera present a greater number of varieties. We have also seen that the species which are the commonest and the most widely diffused vary more than do the rare and restricted species. Let (A) be a common, widely-diffused, and varying species, belonging to a genus large in its own country. The branching and diverging dotted lines of unequal lengths proceeding from (A) may represent its varying offspring. The variations are supposed to be extremely slight, but of the most diversified nature; they are not supposed all to appear simultaneously, but often after long intervals of time; nor are they all supposed to endure for equal periods. Only those variations which are in some way profitable will be preserved or naturally selected. And here the importance of the principle of benefit derived from divergence of character comes in; for this will generally lead to the most different or divergent variations (represented by the outer dotted lines) being preserved and accumulated by natural selection. When a dotted line reaches one of the horizontal lines, and is there marked by a small numbered letter, a sufficient amount of variation is supposed to have been accumulated to form it into a fairly well-marked variety, such as would be thought worthy of record in a systematic work.

The intervals between the horizontal lines in the diagram may represent each a thousand or more generations. After a thousand generations, species (A) is supposed to have produced two fairly well-marked varieties, namely a^1 and m^1. These two varieties will generally still be exposed to the same conditions which made their parents variable, and the tendency to variability is in itself hereditary; consequently they will likewise tend to vary, and commonly in nearly the same manner as did their parents. Moreover, these two varieties, being only slightly modified forms, will tend to inherit those advantages which made their parent (A) more numerous than most of the other inhabitants of the same country; they will also partake of those more general advantages which made the genus to which the parent-species belonged, a large genus in its own country. And all these circumstances are favourable to the production of new varieties.

If, then, these two varieties be variable, the most divergent of their variations will generally be preserved during the next thousand generations. And after this interval, variety a^1 is supposed in the diagram to have produced variety a^2, which will, owing to the principle of divergence, differ more from (A) than did variety a^1. Variety m^1 is supposed to have produced two varieties, namely m^2 and s^2, differing from each other, and more considerably from their common parent (A). We may continue the process by similar steps for any length of time; some of the varieties, after each thousand generations, producing only a single variety, but in a more and more modified condition, some producing two or three varieties, and some failing to produce any. Thus the varieties or modified descendants of the common parent (A), will generally go on

increasing in number and diverging in character. In the diagram the process is represented up to the ten-thousandth generation, and under a condensed and simplified form up to the fourteen-thousandth generation.

But I must here remark that I do not suppose that the process ever goes on so regularly as is represented in the diagram, though in itself made somewhat irregular, nor that it goes on continuously; it is far more probable that each form remains for long periods unaltered, and then again undergoes modification. Nor do I suppose that the most divergent varieties are invariably preserved: a medium form may often long endure, and may or may not produce more than one modified descendant; for natural selection will always act according to the nature of the places which are either unoccupied or not perfectly occupied by other beings; and this will depend on infinitely complex relations. But as a general rule, the more diversified in structure the descendants from any one species can be rendered, the more places they will be enabled to seize on, the more their modified progeny will increase. In our diagram the line of succession is broken at regular intervals by small numbered letters marking the successive forms which have become sufficiently distinct to be recorded as varieties. But these breaks are imaginary, and might have been inserted anywhere, after intervals long enough to allow the accumulation of a considerable amount of divergent variation.

As all the modified descendants from a common and widely-diffused species, belonging to a large genus, will tend to partake of the same advantages which made their parent successful in life, they will generally go on multiplying in number as well as diverging in character: this is represented in the diagram by the several divergent branches proceeding from (A). The modified offspring from the later and more highly improved branches in the lines of descent, will, it is probable, often take the place of, and so destroy, the earlier and less improved branches: this is represented in the diagram by some of the lower branches not reaching to the upper horizontal lines. In some cases no doubt the process of modification will be confined to a single line of descent, and the number of modified descendants will not be increased; although the amount of divergent modification may have been augmented. This case would be represented in the diagram, if all the lines proceeding from (A) were removed, excepting that from a^1 to a^{10}. In the same way the English race-horse and English pointer have apparently both gone on slowly diverging in character from their original stocks, without either having given off any fresh branches or races.

After ten thousand generations, species (A) is supposed to have produced three forms, a^{10}, f^{10}, and m^{10}, which, from having diverged in character during the successive generations, will have come to differ largely, but perhaps unequally, from each other and from their common parent. If we suppose the amount of change between each horizontal line in our diagram to be excessively small, these three forms may still be only well-marked varieties; but we have only to suppose the steps in the process of modification to be more numerous or greater in amount, to convert these three forms into doubtful or at least into well-defined species. Thus the diagram illustrates the steps by which the small

differences distinguishing varieties are increased into the larger differences distinguishing species. By continuing the same process for a greater number of generations (as shown in the diagram in a condensed and simplified manner), we get eight species, marked by the letters between a^{14} and m^{14}, all descended from (A). Thus, as I believe, species are multiplied and genera are formed.

In a large genus it is probable that more than one species would vary. In the diagram I have assumed that a second species (I) has produced, by analogous steps, after ten thousand generations, either two well-marked varieties (w^{10} and z^{10}) or two species, according to the amount of change supposed to be represented between the horizontal lines. After fourteen thousand generations, six new species, marked by the letters n^{14} to z^{14}, are supposed to have been produced. In any genus, the species which are already very different in character from each other, will generally tend to produce the greatest number of modified descendants; for these will have the best chance of seizing on new and widely different places in the polity of nature: hence in the diagram I have chosen the extreme species (A), and the nearly extreme species (I), as those which have largely varied, and have given rise to new varieties and species. The other nine species (marked by capital letters) of our original genus, may for long but unequal periods continue to transmit unaltered descendants; and this is shown in the diagram by the dotted lines unequally prolonged upwards.

But during the process of modification, represented in the diagram, another of our principles, namely that of extinction, will have played an important part. As in each fully stocked country natural selection necessarily acts by the selected form having some advantage in the struggle for life over other forms, there will be a constant tendency in the improved descendants of any one species to supplant and exterminate in each stage of descent their predecessors and their original progenitor. For it should be remembered that the competition will generally be most severe between those forms which are most nearly related to each other in habits, constitution, and structure. Hence all the intermediate forms between the earlier and later states, that is between the less and more improved states of the same species, as well as the original parent-species itself, will generally tend to become extinct. So it probably will be with many whole collateral lines of descent, which will be conquered by later and improved lines. If, however, the modified offspring of a species get into some distinct country, or become quickly adapted to some quite new station, in which offspring and progenitor do not come into competition, both may continue to exist.

If, then, our diagram be assumed to represent a considerable amount of modification, species (A) and all the earlier varieties will have become extinct, being replaced by eight new species (a^{14} to m^{14}); and species (I) will be replaced by six (n^{14} to z^{14}) new species.

But we may go further than this. The original species of our genus were supposed to resemble each other in unequal degrees, as is so generally the case in nature; species (A) being more nearly related to B, C, and D, than to the other species; and species (I) more to G, H, K, L, than to the others. These two species (A) and (I) were also supposed

to be very common and widely diffused species, so that they must originally have had some advantage over most of the other species of the genus. Their modified descendants, fourteen in number at the fourteen-thousandth generation, will probably have inherited some of the same advantages: they have also been modified and improved in a diversified manner at each stage of descent, so as to have become adapted to many related places in the natural economy of their country. It seems, therefore, extremely probable that they will have taken the places of, and thus exterminated, not only their parents (A) and (I), but likewise some of the original species which were most nearly related to their parents. Hence very few of the original species will have transmitted offspring to the fourteen-thousandth generation. We may suppose that only one, (F), of the two species (E and F) which were least closely related to the other nine original species, has transmitted descendants to this late stage of descent.

The new species in our diagram descended from the original eleven species, will now be fifteen in number. Owing to the divergent tendency of natural selection, the extreme amount of difference in character between species a^{14} and z^{14} will be much greater than that between the most distinct of the original eleven species. The new species, moreover, will be allied to each other in a widely different manner. Of the eight descendants from (A) the three marked a^{14}, q^{14}, p^{14}, will be nearly related from having recently branched off from a^{10}; b^{14}, and f^{14}, from having diverged at an earlier period from a^{5}, will be in some degree distinct from the three first-named species; and lastly, o^{14}, e^{14}, and m^{14}, will be nearly related one to the other, but, from having diverged at the first commencement of the process of modification, will be widely different from the other five species, and may constitute a sub-genus or a distinct genus.

The six descendants from (I) will form two sub-genera or genera. But as the original species (I) differed largely from (A), standing nearly at the extreme end of the original genus, the six descendants from (I) will, owing to inheritance alone, differ considerably from the eight descendants from (A); the two groups, moreover, are supposed to have gone on diverging in different directions. The intermediate species, also (and this is a very important consideration), which connected the original species (A) and (I), have all become, excepting (F), extinct, and have left no descendants. Hence the six new species descended from (I), and the eight descendants from (A), will have to be ranked as very distinct genera, or even as distinct sub-families.

Thus it is, as I believe, that two or more genera are produced by descent with modification, from two or more species of the same genus. And the two or more parent-species are supposed to be descended from some one species of an earlier genus. In our diagram, this is indicated by the broken lines, beneath the capital letters, converging in sub-branches downwards towards a single point; this point represents a species, the supposed progenitor of our several new sub-genera and genera.

It is worth while to reflect for a moment on the character of the new species F^{14}, which is supposed not to have diverged much in character,

but to have retained the form of (F), either unaltered or altered only in a slight degree. In this case, its affinities to the other fourteen new species will be of a curious and circuitous nature. Being descended from a form which stood between the parent-species (A) and (I), now supposed to be extinct and unknown, it will be in some degree intermediate in character between the two groups descended from these two species. But as these two groups have gone on diverging in character from the type of their parents, the new species (F^{14}) will not be directly intermediate between them, but rather between types of the two groups; and every naturalist will be able to call such cases before his mind.

In the diagram, each horizontal line has hitherto been supposed to represent a thousand generations, but each may represent a million or more generations; it may also represent a section of the successive strata of the earth's crust including extinct remains. We shall, when we come to our chapter on Geology, have to refer again to this subject, and I think we shall then see that the diagram throws light on the affinities of extinct beings, which, though generally belonging to the same orders, families, or genera, with those now living, yet are often, in some degree, intermediate in character between existing groups; and we can understand this fact, for the extinct species lived at various remote epochs when the branching lines of descent had diverged less.

I see no reason to limit the process of modification, as now explained, to the formation of genera alone. If, in the diagram, we suppose the amount of change represented by each successive group of diverging dotted lines to be great, the forms marked a^{14} to p^{14}, those marked b^{14} and f^{14}, and those marked o^{14} to m^{14}, will form three very distinct genera. We shall also have two very distinct genera descended from (I), differing widely from the descendants of (A). These two groups of genera will thus form two distinct families, or orders, according to the amount of divergent modification supposed to be represented in the diagram. And the two new families, or orders, are descended from two species of the original genus, and these are supposed to be descended from some still more ancient and unknown form.

We have seen that in each country it is the species belonging to the larger genera which oftenest present varieties or incipient species. This, indeed, might have been expected; for, as natural selection acts through one form having some advantatge over other forms in the struggle for existence, it will chiefly act on those which already have some advantage; and the largeness of any group shows that its species have inherited from a common ancestor some advantage in common. Hence, the struggle for the production of new and modified descendants will mainly lie between the larger groups which are all trying to increase in number. One large group will slowly conquer another large group, reduce its numbers, and thus lessen its chance of further variation and improvement. Within the same large group, the later and more highly perfected sub-groups, from branching out and seizing on many new places in the

polity of Nature, will constantly tend to supplant and destroy the earlier and less improved sub-groups. Small and broken groups and sub-groups will finally disappear. Looking to the future, we can predict that the groups of organic beings which are now large and triumphant, and which are least broken up, that is, which have as yet suffered least extinction will, for a long period, continue to increase. But which groups will ultimately prevail, no man can predict; for we know that many groups, formerly most extensively developed, have now become extinct. Looking still more remotely to the future, we may predict that, owing to the continued and steady increase of the larger groups, a multitude of smaller groups will become utterly extinct, and leave no modified descendants; and consequently that, of the species living at any one period, extremely few will transmit descendants to a remote futurity. I shall have to return to this subject in the chapter of Classification, but I may add that as, according to this view, extremely few of the more ancient species have transmitted descendants to the present day, and, as all the descendants of the same species form a class, we can understand how it is that there exists so few classes in each main division of the animal and vegetable kingdoms. Although few of the most ancient species have left modified descendants, yet, at remote geological periods, the earth may have been almost as well peopled with species of many genera families, orders, and classes, as at the present time.

On the Degree to which Organisation tends to advance.

Natural Selection acts exclusively by the preservation and accumulation of variations, which are beneficial under the organic and inorganic conditions to which each nature is exposed at all periods of life. The ultimate result is that each creature tends to become more and more improved in relation to its conditions. This improvement inevitably leads to the gradual advancement of the organisation of the greater number of living beings throughout the world. But here we enter on a very intricate subject, for naturalists have not defined to each other's satisfaction what is meant by an advance in organisation. Amongst the vertebrata the degree of intellect and an approach in structure to man clearly come into play. It might be thought that the amount of change which the various parts and organs pass through in their development from the embryo to maturity would suffice as a standard of comparison; but there are cases, as with certain parasitic crustaceans, in which several parts of the structure become less perfect, so that the mature animal cannot be called higher than its larva. Von Baer's standard

seems the most widely applicable and the best, namely, the amount of differentiation of the parts of the same organic being, in the adult state as I should be inclined to add, and their specialisation for different functions; or, as Milne Edwards would express it, the completeness of the division of physiological labour. But we shall see how obscure this subject is if we look, for instance, to fishes, amongst which some naturalists rank those as highest which, like the sharks, approach nearest to amphibians; whilst other naturalists rank the common bony or teleostean fishes as the highest, inasmuch as they are most strictly fish-like, and differ most from the other vertebrate classes. We see still more plainly the obscurity of the subject by turning to plants, amongst which the standard of intellect is of course quite excluded; and here some botanists rank those plants as highest which have every organ, as sepals, petals, stamens, and pistils, fully developed in each flower; whereas other botanists, probably with more truth, look at the plants which have their several organs much modified and reduced in number as the highest.

If we take as the standard of high organisation, the amount of differentiation and specialisation of the several organs in each being when adult (and this will include the advancement of the brain for intellectual purposes), natural selection clearly leads towards this standard; for all physiologists admit that the specialisation of organs, inasmuch as in this state they perform their functions better, is an advantage to each being; and hence the accumulation of variations tending towards specialisation is within the scope of natural selection. On the other hand, we can see, bearing in mind that all organic beings are striving to increase at a high ratio and to seize on every unoccupied or less well occupied place in the economy of nature, that it is quite possible for natural selection gradually to fit a being to a situation in which several organs would be superfluous or useless: in such cases there would be retrogression in the scale of organisation. Whether organisation on the whole has actually advanced from the remotest geological periods to the present day will be more conveniently discussed in our chapter on Geological Succession.

But it may be objected that if all organic beings thus tend to rise in the scale, how is it that throughout the world a multitude of the lowest forms still exist; and how is it that in each great class some forms are far more highly developed than others? Why have not the more highly developed forms everywhere supplanted and exterminated the lower?

Lamarck, who believed in an innate and inevitable tendency towards perfection in all organic beings, seems to have felt this difficulty so strongly, that he was led to suppose that new and simple forms are continually being produced by spontaneous generation. Science has not as yet proved the truth of this belief, whatever the future may reveal. On our theory the continued existence of lowly organisms offers no difficulty; for natural selection, or the survival of the fittest, does not necessarily include progressive development—it only takes advantage of such variations as arise and are beneficial to each creature under its complex relations of life. And it may be asked what advantage, as far as we can see, would it be to an infusorian animalcule—to an intestinal worm—or even to an earth-worm, to be highly organised. If it were no advantage, these forms would be left, by natural selection, unimproved or but little improved, and might remain for indefinite ages in their present lowly condition. And geology tells us that some of the lowest forms, as the infusoria and rhizopods, have remained for an enormous period in nearly their present state. But to suppose that most of the many now existing low forms have not in the least advanced since the first dawn of life would be extremely rash; for every naturalist who has dissected some of the beings now ranked as very low in the scale, must have been struck with their really wondrous and beautiful organisation.

Nearly the same remarks are applicable if we look to the different grades of organisation within the same great group; for instance, in the vertebrata, to the co-existence of mammals and fish—amongst mammalia, to the co-existence of man and the ornithorhynchus—amongst fishes, to the co-existence of the shark and the lancelet (Amphioxus), which latter fish in the extreme simplicity of its structure approaches the invertebrate classes. But mammals and fish hardly come into competition with each other; the advancement of the whole class of mammals, or of certain members in this class, to the highest grade would not lead to their taking the place of fishes. Physiologists believe that the brain must be bathed by warm blood to be highly active, and this requires aërial respiration; so that warm-blooded mammals when inhabiting the water lie under a disadvantage in having to come continually to the surface to breathe. With fishes, members of the shark family would not tend to supplant the lancelet; for the lancelet, as I hear from Fritz Müller, has as sole companion and competitor on the barren, sandy shore of South Brazil, an anomalous annelid. The

three lowest orders of mammals, namely, marsupials, edentata, and rodents, co-exist in South America in the same region with numerous monkeys, and probably interfere little with each other. Although organisation, on the whole, may have advanced and be still advancing throughout the world, yet the scale will always present many degrees of perfection; for the high advancement of certain whole classes, or of certain members of each class, does not at all necessarily lead to the extinction of those groups with which they do not enter into close competition. In some cases, as we shall hereafter see, lowly organised forms appear to have been preserved to the present day, from inhabiting confined or peculiar stations, where they have been subjected to less severe competition, and where their scanty numbers have retarded the chance of favourable variations arising.

Finally, I believe that many lowly organised forms now exist throughout the world, from various causes. In some cases variations or individual differences of a favourable nature may never have arisen for natural selection to act on and accumulate. In no case, probably, has time sufficed for the utmost possible amount of development. In some few cases there has been what we must call retrogression of organisation. But the main cause lies in the fact that under very simple conditions of life a high organisation would be of no service,—possibly would be of actual disservice, as being of a more delicate nature, and more liable to be put out of order and injured.

Looking to the first dawn of life, when all organic beings, as we may believe, presented the simplest structure, how, it has been asked, could the first steps in the advancement or differentiation of parts have arisen? Mr. Herbert Spencer would probably answer that, as soon as simple unicellular organism came by growth or division to be compounded of several cells, or became attached to any supporting surface, his law "that homologous units of any order become differentiated in proportion as their relations to incident forces become different" would come into action. But as we have no facts to guide us, speculation on the subject is almost useless. It is, however, an error to suppose that there would be no struggle for existence, and, consequently, no natural selection, until many forms had been produced; variations in a single species inhabiting an isolated station might be beneficial, and thus the whole mass of individuals might be modified, or two distinct forms might arise. But, as I remarked towards the close of the Introduction, no one ought to feel surprise at much remaining as yet unexplained on

the origin of species, if we make due allowance for our profound ignorance on the mutual relations of the inhabitants of the world at the present time, and still more so during past ages.

Convergence of Character.

Mr. H. C. Watson thinks that I have overrated the importance of divergence of character (in which, however, he apparently believes), and that convergence, as it may be called, has likewise played a part. If two species, belonging to two distinct though allied genera, had both produced a large number of new and divergent forms, it is conceivable that these might approach each other so closely that they would have all to be classed under the same genus; and thus the descendants of two distinct genera would converge into one. But it would in most cases be extremely rash to attribute to convergence a close and general similarity of structure in the modified descendants of widely distinct forms. The shape of a crystal is determined solely by the molecular forces, and it is not surprising that dissimilar substances should sometimes assume the same form; but with organic beings we should bear in mind that the form of each depends on an infinitude of complex relations, namely on the variations which have arisen, those being due to causes far too intricate to be followed out,—on the nature of the variations which have been preserved or selected, and this depends on the surrounding physical conditions, and in a still higher degree on the surrounding organisms with which each being has come into competition,—and lastly, on inheritance (in itself a fluctuating element) from innumerable progenitors, all of which have had their forms determined through equally complex relations. It is incredible that the descendants of two organisms, which had originally differed in a marked manner, should ever afterwards converge so closely as to lead to a near approach to identity throughout their whole organisation. If this had occurred, we should meet with the same form, independently of genetic connection, recurring in widely separated geological formations; and the balance of evidence is opposed to any such an admission.

Mr. Watson has also objected that the continued action of natural selection, together with divergence of character, would tend to make an indefinite number of specific forms. As far as mere inorganic conditions are concerned, it seems probable that a sufficient number of species would soon become adapted to all considerable diversities of heat, moisture, &c.; but I fully admit that the mutual relations of organic beings are more important; and as the number of species in any country goes

on increasing, the organic conditions of life must become more and more complex. Consequently there seems at first sight no limit to the amount of profitable diversification of structure, and therefore no limit to the number of species which might be produced. We do not know that even the most prolific area is fully stocked with specific forms: at the Cape of Good Hope and in Australia, which support such an astonishing number of species, many European plants have become naturalised. But geology shows us, that from an early part of the tertiary period the number of species of shells, and that from the middle part of this same period the number of mammals, has not greatly or at all increased. What then checks an indefinite increase in the number of species? The amount of life (I do not mean the number of specific forms) supported on an area must have a limit, depending so largely as it does on physical conditions; therefore, if an area be inhabited by very many species, each or nearly each species will be represented by few individuals; and such species will be liable to exterminate from accidental fluctuations in the nature of the seasons or in the number of their enemies. The process of extermination in such cases would be rapid, whereas the production of new species must always be slow. Imagine the extreme case of as many species as individuals in England, and the first severe winter or very dry summer would exterminate thousands on thousands of species. Rare species, and each species will become rare if the number of species in any country becomes indefinitely increased, will, on the principle often explained, present within a given period few favourable variations; consequently, the process of giving birth to new specific forms would thus be retarded. When any species becomes very rare, close interbreeding will help to exterminate it; authors have thought that this comes into play in accounting for the deterioration of the Aurochs in Lithuania, of Red Deer in Scotland, and of Bears in Norway, &c. Lastly, and this I am inclined to think is the most important element, a dominant species, which has already beaten many competitors in its own home, will tend to spread and supplant many others. Alph. de Candolle has shown that those species which spread widely, tend generally to spread very widely; consequently, they will tend to supplant and exterminate several species in several areas, and thus check the inordinate increase of specific forms throughout the world. Dr. Hooker has recently shown that in the S.E. corner of Australia, where, apparently, there are many invaders from different quarters of the globe, the endemic Australian species have been greatly reduced in number. How

much weight to attribute to these several considerations I will not pretend to say; but conjointly they must limit in each country the tendency to an indefinite augmentation of specific forms.

Summary of Chapter.

If under changing conditions of life organic beings present individual differences in almost every part of their structure, and this cannot be disputed; if there be, owing to their geometrical rate of increase, a severe struggle for life at some age, season, or year, and this certainly cannot be disputed; then, considering the infinite complexity of the relations of all organic beings to each other and to their conditions of life, causing an infinite diversity in structure, constitution, and habits, to be advantageous to them, it would be a most extraordinary fact if no variations had ever occurred useful to each being's own welfare, in the same manner as so many variations have occurred useful to man. But if variations useful to any organic being ever do occur, assuredly individuals thus characterised will have the best chance of being preserved in the struggle for life; and from the strong principle of inheritance, these will tend to produce offspring similarly characterised. This principle of preservation, or the survival of the fittest, I have called Natural Selection. It leads to the improvement of each creature in relation to its organic and inorganic conditions of life; and consequently, in most cases, to what must be regarded as an advance in organisation. Nevertheless, low and simple forms will long endure if well fitted for their simple conditions of life.

Natural selection, on the principle of qualities being inherited at corresponding ages, can modify the egg, seed, or young, as easily as the adult. Amongst many animals, sexual selection will have given its aid to ordinary selection, by assuring to the most vigorous and best adapted males the greatest number of offspring. Sexual selection will also give characters useful to the males alone, in their struggles or rivalry with other males; and these characters will be transmitted to one sex or to both sexes, according to the form of inheritance which prevails.

Whether natural selection has really thus acted in adapting the various forms of life to their several conditions and stations, must be judged by the general tenor and balance of evidence given in the following chapters. But we have already seen how it entails extinction; and how largely extinction has acted in the world's history, geology plainly declares. Natural selection, also, leads to divergence of character; for the more organic beings diverge in structure, habits, and constitution,

by so much the more can a large number be supported on the area,—of which we see proof by looking to the inhabitants of any small spot, and to the productions naturalised in foreign lands. Therefore, during the modification of the descendants of any one species, and during the incessant struggle of all species to increase in numbers, the more diversified the descendants become, the better will be their chance of success in the battle for life. Thus the small differences distinguishing varieties of the same species, steadily tend to increase, till they equal the greater differences betwen species of the same genus, or even of distinct genera.

We have seen that it is the common, the widely diffused and widely-ranging species, belonging to the larger genera within each class, which vary most; and these tend to transmit to their modified offspring that superiority which now makes them dominant in their own countries. Natural selection, as has just been remarked, leads to divergence of character and to much extinction of the less improved and intermediate forms of life. On these principles, the nature of the affinities, and the generally well-defined distinctions between the innumerable organic beings in each class throughout the world, may be explained. It is a truly wonderful fact—the wonder of which we are apt to overlook from familiarity—that all animals and all plants throughout all time and space should be related to each other in groups, subordinate to groups, in the manner which we everywhere behold—namely, varieties of the same species most closely related, species of the same genus less closely and unequally related, forming sections and sub-genera, species of distinct genera much less closely related, and genera related in different degrees, forming sub-families, families, orders, sub-classes and classes. The several subordinate groups in any class cannot be ranked in a single file, but seem clustered round points, and these round other points, and so on in almost endless cycles. If species had been independently created, no explanation would have been possible of this kind of classification; but it is explained through inheritance and the complex action of natural selection, entailing extinction and divergence of character, as we have seen illustrated in the diagram.

The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during former years may répresent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the sur-

rounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs; and this connection of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear the other branches; so with the species which lived during long-past geological periods, very few have left living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these fallen branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only in a fossil state. As we here and there see a thin straggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the Ornithorhynchus or Lepidosiren, which in some small degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.

ERNST HAECKEL

Ernst Haeckel was born in Potsdam, Prussia, Feb. 16, 1834. He received a thorough university education, and in 1862 became Professor of Zoology at Jena. He was the first outspoken Darwinian in Germany. He developed especially the theory that the history of the embryo follows the history of the race to which it belongs. Von Baer had made the first step in the theory, but Haeckel extended it and did

HAECKEL

rounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs; and this connection of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear the other branches: so with the species which lived during long-past geological periods, very few have left living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these fallen branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only in a fossil state. As we here and there see a thin straggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the Ornithorhynchus or Lepidosiren, which in some degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.

ERNST HAECKEL

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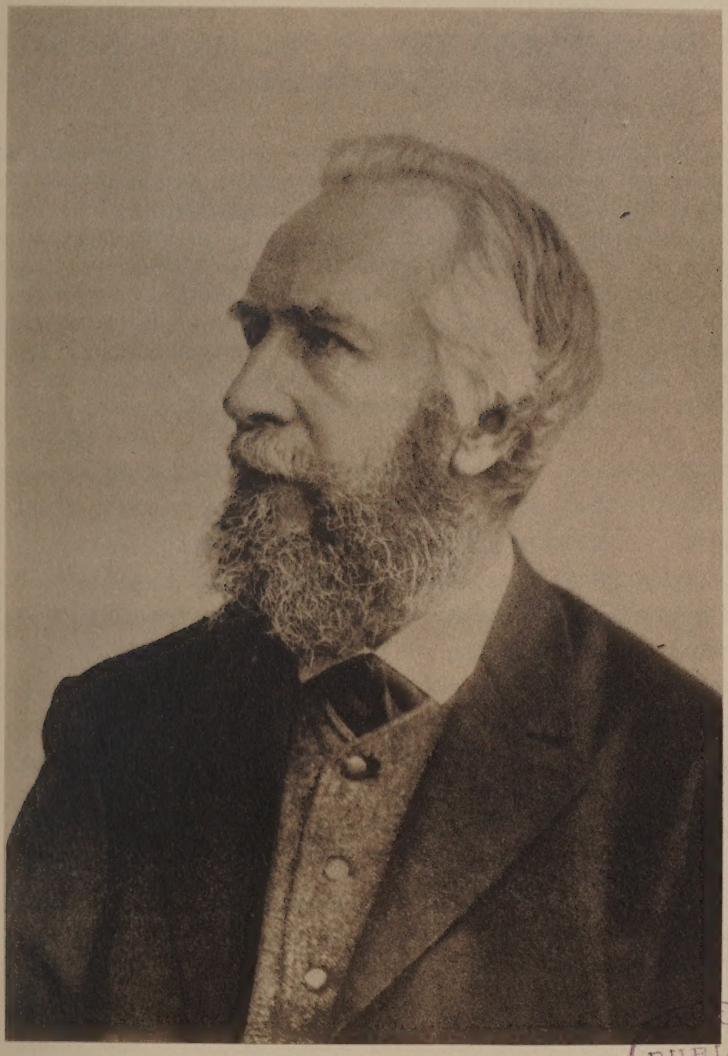

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much to prove its general truth. His investigations on the lower classes of marine organisms are also classical.

THE FUNDAMENTAL LAW OF THE EVOLUTION OF ORGANISMS

"The History of the Evolution of Organisms consists of two kindred and closely connected parts: Ontogeny, which is the history of the evolution of individual organisms, and Phylogeny, which is the history of the evolution of organic tribes. Ontogeny is a brief and rapid recapitulation of Phylogeny, dependent on the physiological functions of heredity (reproduction) and adaptation (nutrition). The individual organism reproduces in the rapid and short course of its own evolution the most important of the changes in form through which its ancestors, according to laws of heredity and adaptation, have passed in the slow and long course of their palæontological evolution."—HAECKEL'S *Generelle Morphologie* (1866).

The natural phenomena of the evolutionary history of man claim an entirely peculiar place in the wide range of the scientific study of nature. There is surely no subject of scientific investigation touching man more closely, or in the knowledge of which he is more deeply concerned, than the human organism itself; and of all the various branches of the science of man, or anthropology, the history of his natural evolution should excite his highest interest. For it affords a key for the solution of the greatest of those problems at which human science is striving. The greatest problems with which human science is occupied—the inquiry into the true nature of man, or, as it is called, the question of "Man's Place in Nature," which deals with the past and primitive history, the present condition, and future of Man—are all most directly and intimately linked to this branch of scientific research, which is called The History of the Evolution of Man, or briefly, "Anthropogeny." It is, however, a most astonishing but incontestable fact, that the history of the evolution of man as yet constitutes no part of general education. Indeed, our so-called "educated classes" are to this day in total ignorance of the most important circumstances and the most remarkable phenomena which Anthropogeny has brought to light.

In corroboration of this most astounding fact, I will only mention that most "educated people" do not even known that each human individual is developed from an egg, and that this egg is a simple cell, like that of any animal or plant. They are also ignorant of the fact that, in the development of this egg, an organism is first formed which is entirely

different from the fully developed human body, to which it bears no trace of resemblance. The majority of "educated people" have never seen such a human germ, or embryo, in the early stages of development, nor are they aware that it is not at all different from those of other animals. They do not know that, at a certain period, this embryo has essentially the anatomical structure of a lancelet, later of a fish, and in subsequent stages those of amphibian and mammal forms; and that in the further evolution of these mammal forms those first appear which stand lowest in the series, namely, forms allied to the beaked animals (*Ornithorhynchus*); then those allied to pouched animals (*Marsupialia*), which are followed by forms most resembling apes; till at last the peculiar human form is produced as the final result. These significant facts are so little known that, when incidentally mentioned, they are commonly doubted, or are even regarded as unfounded inventions. Every one knows that the butterfly proceeds from a pupa, the pupa from a caterpillar, to which it bears no resemblance, and again the caterpillar from the egg of the butterfly. But few, except those of the medical profession, are aware that man, in the course of his individual evolution, passes through a series of transformations no less astonishing and remarkable than the well-known metamorphoses of the butterfly. The mere tracing of this wonderful series of forms, through which the human embryo passes in the course of its development, is, of course, of great general interest. But our understanding will be satisfied in a far higher degree, if we refer these remarkable facts to their final causes, and recognize that these natural phenomena are of the utmost importance to the entire range of human knowledge. They are of special importance to the "History of Creation," and, in connection with this, to philosophy in general—as we shall presently see. Further, as the general results of all human striving after knowledge are summed up in philosophy, it follows that every branch of scientific research comes more or less in contact with, and is influenced by, the History of the Evolution of Man.

In undertaking to describe the most important characteristics of these significant phenomena, and to trace them back to their final causes, I shall assign a much greater scope and aim to the History of the Evolution of Man than is usual. The lectures given on this subject in German universities during the past fifty years have been exclusively designed for medical students. It is true that the physician is most deeply interested in becoming acquainted with the development of the bodily organization of man, with which he deals, practically, from day

to day, in his profession. I shall not here attempt to give a special account of the course of the evolution of the individual, such as has usually been given in embryological lectures, because few of my readers have studied human anatomy, or are acquainted with the physical structure of the developed man. Hence, I shall have to confine myself in many points to general outlines, neglecting many of the remarkable details, which would have to be discussed in treating of the evolution of special human organs, but which from their complicated nature, and because they are not easy to describe, can only be completely understood by the aid of an intimate acquaintance with human anatomy. I shall strive, however, to present this branch of the science in as popular a form as possible. A satisfactory general idea of the course of the evolution of the human embryo can, indeed, be given without going very deeply into anatomical details. As numerous successful attempts have recently been made to awaken the interest of larger classes of educated persons in other branches of science, I also may hope to succeed in this department, though it is in many respects especially beset with difficulties.

The History of the Evolution of Man, as it has been usually treated in lectures for medical students at the universities, has only concerned itself with Embryology, so-called, or more correctly with Ontogeny, in other words, with the history of the evolution of individual human organisms. This, however, is only the first part of the task before us, only the first half of the History of the Evolution of Man in the wider sense which will here be attributed to the term. The second part, equal in importance and interest, is Phylogeny, which is the history of the evolution of the descent of man, that is, of the evolution of the various animal forms through which, in the course of countless ages, mankind has gradually passed into its present form. All my readers know of the very important scientific movement which Charles Darwin caused fifteen years ago, by his book on the Origin of Species. The most important direct consequence of this work, which marks a fresh epoch, has been to cause new inquiries to be made into the origin of the human race, which have proved the natural evolution of man through lower animal forms. The science which treats of the development of the human race from the animal kingdom is called Phylogeny, or the tribal history of man. The most important source from which the science derives its material is Ontogeny, or the history of germs, in other words, of the evolution of the individual. Palæontology, or the science of petrifactions, and, in a

yet greater degree, comparative anatomy, also afford most important aid to Phylogeny.

These two divisions of our science, Ontogeny, or the history of the germ, Phylogeny, or the history of the tribe, are most intimately connected, and the one cannot be understood without the other. The close intertwining of both branches, the increased proportions which germ-history and tribal history lend to each other, alone raise Biogeny (or the history of organic evolution, in the widest sense) to the rank of a philosophic natural science. The connection between the two is not external and superficial, but deeply internal and causal. Our knowledge of this connection has been but very recently obtained; it is most clearly and accurately expressed in the comprehensive statement which I call "the fundamental law of organic evolution," or more briefly, "the first principle of Biogeny."

This fundamental law, to which we shall recur again and again, and on the recognition of which depends the thorough understanding of the history of evolution, is briefly expressed in the proposition: that the History of the Germ is an epitome of the History of the Descent; or, in other words: that Ontogeny is a recapitulation of Phylogeny; or, somewhat more explicitly: that the series of forms through which the individual organism passes during its progress from the egg cell to its fully developed state, is a brief, compressed reproduction of the long series of forms through which the animal ancestors of that organism (or the ancestral forms of its species) have passed from the earliest periods of so-called organic creation down to the present time.

The causal nature of the relation which connects the History of the Germ (Embryology, or Ontogeny) with that of the tribe (Phylogeny) is dependent on the phenomena of heredity and adaptation. When these are properly understood, and their fundamental importance in determining the forms of organisms recognized, we may go a step further, and say: Phylogenesis is the mechanical cause of Ontogenesis. The Evolution of the Tribe, which is dependent on the laws of heredity and adaptation, effects all the events which take place in the course of the Evolution of the Germ or Embryo.

The chain of different animal forms which, according to the theory of descent, constitutes the series of ancestors, or chain of forefathers of every higher organism, and hence also of man, always forms a connected whole. This unbroken succession of forms may be represented by the letters of the alphabet A, B, C, D, E, etc., down to Z, in their

alphabetical order. In apparent contradiction to this, the history of the individual evolution or the Ontogeny of most organisms show us only a fragment of this series of forms, so that the interrupted chain of embryonic forms would be represented by something like: A, B, F, H, I, K, L, etc.; or in other cases thus: B, D, H, L, M, N, etc. Several evolutionary forms have, therefore, usually dropped out of the originally unbroken chain of forms. In many cases also (retaining the figure of the repeated alphabet) one or more letters, representing ancestral forms, are replaced in the corresponding places among the embryonic forms by equivalent letters of another alphabet. Thus, for example, in place of the Latin B or D, a Greek B or Δ is often found. Here, therefore, the text of the biogenetic first principle is vitiated, while in the former case it was epitomized. This gives more importance to the fact that, notwithstanding this, the sequence remains the same, so that we are enabled to recognize its original order.

Indeed, there is always a complete parallelism between the two series of evolution. This is, however, vitiated by the fact that in most cases many forms which formerly existed and actually lived in the phylogenetic series are now wanting, and have been lost from the ontogenetic series of evolution. If the parallelism between the two series were perfect, and if this great fundamental law of the causal connection between Ontogeny and Phylogeny, in the strict sense of the word, had full and unconditional sway, we should only have to ascertain, with the aid of microscope and scalpel, the series of forms through which the fertilized human egg passes before it attains its complete development. Such an examination would at once give us a complete picture of the remarkable series of forms through which the animal ancestors of the human race have passed, from the beginning of organic creation to the first appearance of man. But this reproduction of the Phylogeny in the Ontogeny is complete only in rare instances, and seldom corresponds to the entire series of the letters of the alphabet. In fact, in most cases the epitome is very incomplete, and greatly altered and perverted by causes which we shall investigate hereafter. Hence we are seldom able to determine directly, by means of its Ontogeny, the different forms through which the ancestry of each organism has passed; on the contrary, we commonly find—and not less so in the Phylogeny of man—a number of gaps. We are, however, able to bridge over the greater part of these gaps satisfactorily by the help of comparative anatomy, though not to fill them up directly, by ontogenetic research. It is therefore all the more import-

ant that we are acquainted with a considerable number of lower animal forms which still find place in the history of the individual evolution of man. In such cases, from the nature of the transient individual form, we may quite safely infer the nature of the ancestral animal form.

For example, from the fact that the human egg is a simple cell, we may at once infer that there has been at a very remote time a unicellular ancestor of the human race resembling an amœba. Again, from the fact that the human embryo originally consists merely of two simple germ-layers, we may at once safely infer that a very ancient ancestral form is represented by the two-layered gastræa. A later embryonic form of the human being points with equal certainty to a primitive worm-like ancestral form which is related to the sea-squirts or ascidians of the present day. But the low animal forms which constitute the ancestral line between the unicellular amœba and the gastræa, and further between the gastræa and the ascidian form, can only be approximately conjectured with the aid of comparative anatomy and Ontogeny. On account of a shortened process of heredity, various ontogenetic intermediate forms, which must have existed phylogenetically, or in the ancestral lineage, have in the course of historic evolution gradually dropped out from these gaps. But notwithstanding these numerous and sometimes very considerable gaps, there is, on the whole, complete agreement between the two series of evolution. Indeed, it will be one of my principal objects to prove the deep harmony, and original parallelism, between the two series. By adducing numerous facts, I hope to convince my readers that from the actually existing series of embryonic forms which can be shown at any time, we are able to draw the most important conclusions as to the genealogical tree of the human species. We shall thus be able to form a general picture of the series of animal forms which succeeded each other as the direct ancestors of man, in the long course of the history of the organic world.

In this phylogenetic significance of ontogenetic phenomena, it is, of course, most important to distinguish clearly and exactly between the original, palingenetic processes of evolution, and the later kenogenetic processes of the same. The term *palingenetic process* (or reproduction of the history of the germ) is applied to all such phenomena in the history of evolution as are exactly reproduced, in consequence of conservative heredity, in each succeeding generation, and which, therefore, enables us directly to infer the corresponding processes in the tribal history of the developed ancestors. The *term kenogenetic* process (or

vitiation of the history of the germ) is applied to all such processes in the germ-history as are not to be explained by heredity from primæval parent-forms, but which have been acquired at a later time in consequence of the adaptation of the germ, or embryo form, to special conditions of evolution. These kenogenetic processes are recent additions, which do not allow of direct inference as to the corresponding processes in the tribal history of the ancestral line, but which rather falsify and conceal the latter.

This critical distinction between the primary palingenetic, and the secondary kenogenetic processes is, of course, of the greatest importance to scientific Phylogeny, which, from the available empiric material supplied by Ontogeny, by comparative anatomy, and by palæontology, seeks to infer the long extinct historical processes of tribal evolution. It is of the same importance to the student of evolution as is the critical distinction between corrupt and genuine passages in the text of an old writer to the philologist; the separation of the original text from interpolations and corrupt readings. This distinction between palingenesis or inherited evolution, and kenogenesis or vitiated evolution, has not, however, yet been sufficiently appreciated by naturalists. But I believe that it is the first condition requisite, if the history of evolution is to be really understood, and I think that two separate main divisions, based on this distinction, must be made in germ-history; palingenesis or inherited history, and kenogenesis or vitiated history.

Let us illustrate this highly important distinction by a few examples taken from the evolution of man. In man, as in all other higher vertebrates, the following incidents of germ-history must be regarded as palingenetic processes: the formation of the two primary germ-layers, the appearance of a simple notochord (*chorda*) between the spinal tube and the intestinal tube, the transitory formation of gill-arches and gill-openings, of primitive kidneys, of the primitive brain bladder, the hermaphrodite rudiment of the sexual organs, etc. All these, and many other important phenomena have evidently been accurately handed down, by constant heredity, from the primæval ancestors of mammals, and must, therefore, be referred directly to corresponding palæontological evolutionary incidents in the history of the tribe. On the other hand, this is not the case with the following germinal incidents, which must be explained as kenogenetic processes; the formation of the yelk-sac, of the allantois and placenta, of the amnion and chorion, and, generally, of the different egg-membranes and the corresponding systems of blood-ves-

sels; also the transitory separation of the primitive vertebrate plates and the side-plates, the secondary closing of the stomach wall and the intestinal wall, the formation of the navel, etc. All these, and many other phenomena are evidently not referable to corresponding conditions of an earlier, independent, and fully developed parent form, but must be explained as solely due to adaptation to the peculiar conditions of egg-life or embryo-life (within the egg-membranes). With reference to this fact we may now define our "first principle of Biogeny" more exactly as follows: "The evolution of the germ (Ontogeny) is a compressed and shortened reproduction of the evolution of the tribe (Phylogeny); and, moreover, this reproduction is more complete, in proportion as, in consequence of constant heredity, the original inherited evolution (palingenesis) is more closely retained; on the other hand, the repetition is more incomplete, in proportion as the later vitiated evolution (kenogenesis) is introduced by changing adaptation."

The kenogenetic vitiations of the original, palingenetic incidents of evolution depend in great measure on a gradually occurring displacement of the phenomena, which is effected in the course of many thousands of years by adaptation to the changed conditions of embryonic existence. This displacement may effect either the place or the time of the phenomena. If the former, it is called heterotopy; if the latter, heterochrony.

"Displacement in position," or "heterotopy," especially affects the cells or elementary parts which compose the organs; but it also affects the organs themselves. For example, the sexual organs of the human embryo, as well as those of many higher animals, appear to originate from the middle germ-layer. But the comparative Ontogeny of the lower animals shows, on the other hand, that these organs did not originally arise from this layer, but from one of the primary germ-layers; the male sexual organs from the outer germ-layer, the female from the inner. Gradually, however, the germ-cells have altered their original site, and have made their way, at an earlier period, from their original position into the middle germ-layer, so that they now appear actually to originate in the latter. An analogous heterotopism affects the primitive kidneys in the higher vertebrates. Even the appearance of the mesoderm itself is very greatly affected by a displacement in position, which is connected with the transition of embryo cells from one germ-layer into another.

The kenogenetic "displacements in time," or "heterochronisms," are

equally significant. They are seen in the fact that in the germ-history (Ontogeny) the sequence in which the organs appears differs from that which, judging from the tribal history (Phylogeny), would be expected. By heterotopy the sequence in position is vitiated; similarly, by heterochrony the sequence in time is vitiated. This vitiation may effect either an acceleration or a retardation in the appearance of the organs. We must regard the following incidents in the germ-history of man as examples of ontogenetic acceleration: the early appearance of the heart, the gill-openings, the brain, the eyes, the *chorda,* etc. It is evident that these organs appear earlier in relation to others than was originally the case in the history of the tribe. The reverse is true of the retarded completion of the intestinal canal, the body-cavity, and the sexual organs. It is evident that in these cases there is an ontogenetic postponement or retardation.

It is only by critically appreciating these kenogenetic incidents in relation to the palingenetic, and by constantly allowing for the changes in inherited evolution effected by vitiated evolution, that it is possible to recognize the fundamental significance of the first principle of Biogeny, which in this way attains its true value as the most important explanatory principle of the history of evolution. When it is thus critically appreciated, this first principle also proves to be the "red thread" on which we can string every one of the phenomena in this wonderful domain; this is the thread of Ariadne, with the aid of which alone we are able to find an intelligible course through this complicated labyrinth of forms. Even at an earlier period, when the history of the evolution of the human and the animal individual first became somewhat more accurately known—which is hardly half a century ago!—people were greatly surprised at the wonderful similarity existing in the ontogenetic forms, or the stages of the individual evolution, of very different animals. They noticed also the remarkable resemblance between these and certain developed animal forms of allied lower groups. Even the older natural philosophers recognized the fact that in a certain way these lower animals permanently represent in the system of the animal kingdom forms which appear transiently in the evolution of individuals of higher groups. But formerly it was impossible to understand and interpret aright this remarkable resemblance. Darwin's greatest merit is that he has now enabled us to understand this circumstance. This gifted naturalist was the first to place the phenomena of heredity on the one hand, and of adaptation on the other, in their true light, and to show the fun-

damental significance of their constant interaction in the production of organic forms. He was the first to point out the important part played by the continual Struggle for Existence in which all organisms take part, and how, under its influence, through Natural Selection, new species of organisms have arisen, and still arise, entirely by the interaction of heredity and adaptation. Darwin thus enabled us properly to understand the immensely important relation existing between the two divisions of the History of Evolution: Ontogeny and phylogeny.

If the phenomena of heredity and adaptation are left unnoticed, if these two formative physiological functions of the organism are not taken into account, then it is entirely impossible thoroughly to understand the History of Evolution; so that before the time of Darwin we had no clear idea of the real nature and causes of the development of germs. It was utterly impossible to explain the strange series of forms through which a human being passes in its embryonic evolution; it was impossible to comprehend the reason of the curious series of various animal-like forms which appear in the Ontogeny of man. Previously it was even generally believed that the whole human being, with all its parts foreshadowed, existed even in the egg, and that his evolution was only an unfolding of the form, a simple process of growth. But this is not at all the case. On the contrary, the entire process of the evolution of the individual presents to the eye a connected series of diverse animal forms; and these various animal forms exhibit very diverse conditions of external and internal structure. The reason why every human individual must pass through this series of forms in the course of his embryonic evolution, was first explained to us by the Theory of Descent of Lamarck and Darwin. From this theory we first learn the efficient causes (*causae efficientes*) of individual evolution; by the aid of this theory we first perceive that such mechanical causes alone suffice to effect the evolution of the individual organism, and that the co-operation of designing, or teleological causes (*causae finales*), which were formerly universally assumed, is unnecessary. Of course, these final causes still play an important part in the prevailing school-philosophy; but in our new natural philosophy we are enabled to replace them entirely by the efficient causes.

I allude to this matter at this early stage, in order to call attention to one of the most important advances made in any branch of human knowledge during the past ten years. The history of philosophy shows that in the cosmology of our day, as in that of antiquity, final causes are

almost universally deemed to be the real ultimate causes of the phenomena of organic life, and especially those of the life of man. The prevailing Doctrine of Design, or Teleology, assumes that the phenomena of organic life, and in particular those of evolution, are explicable only by purposive causes, and that, on the contrary, they in no way admit of a mechanical explanation, that is, one entirely based on natural science. The most difficult problems in this respect which have been before us, and which seemed capable of solution only by means of teleology, are, however, precisely those which have been mechanically solved in the Theory of Descent. The reconstruction of the history of the evolution of man, which this theory has effected, has actually removed the greatest difficulties. We shall see in the course of our inquiries how, through Darwin's reform of the Doctrine of Evolution, the most wonderful problems, hitherto deemed unapproachable, of the organization of man and animals have admitted of a natural solution, of a mechanical explanation, by non-purposive causes. It has enabled us to substitute everywhere unconscious causes acting from necessity, for conscious purposive causes.

If the recent progress in the Doctrine of Evolution had accomplished only this, every thoughtful person must have admitted that even in this an immense advance had been made in knowledge. In consequence of it, the tendency called unitary or monistic, in contradistinction to the dualistic, or binary, which has heretofore prevailed in speculative philosophy, must ultimately prevail throughout philosophy. This is the point at which the history of the evolution of man at once penetrates deeply into the very foundations of philosophy. For this reason alone it is very much to be desired, in fact is indispensable, that anyone who aspires to philosophic culture should learn the most important facts in this field of research.

The significance of the facts of Ontogeny is so great and so evident that the dualistic teleological philosophy, finding them extremely inconvenient, has of late endeavoured to meet them by simple denial. Such, for instance, has been the case with the fact that every human being develops from an egg, and that this egg is a simple cell, like the egg-cell of all other animals. When in my "History of Creation" I had discussed this fundamental fact, and had directed attention to its immense significance, several theological periodicals pronounced it a malicious invention of my own. The evident fact that at a certain stage of their evolution the embryos of man and of the dog are entirely indistinguishable from one another was also denied.

The fact is that an examination of the human embryo in the third or fourth week of its evolution shows it to be altogether different from the fully developed man, and that it exactly corresponds to the undeveloped embryo-form presented by the ape, the dog, the rabbit, and other mammals, at the same stage of their Ontogeny. At this stage it is a bean-shaped body of very simple structure, with a tail behind, and two pairs of paddles, resembling the fins of a fish, and totally dissimilar to the limbs of man and other mammals, at the sides. Nearly the whole of the front half of the body consists of a shapeless head without a face, on the sides of which are seen gill-fissures and gill-arches as in fishes. In this stage of evolution the human embryo differs in no essential way from the embryo of an ape, dog, horse, ox, etc., at a corresponding age. Even such facts as these, which can be easily and promptly demonstrated at any time by placing side by side the corresponding embryos of man, a dog, a horse, etc., have been spoken of by theologians and teleological philosophers as inventions of materialism; and even naturalists, who were presumably acquainted with them, have tried to deny them. No stronger proof, surely, of the immense radical importance of these embryological facts in favour of the monistic philosophy can be given than these efforts on the part of the dualistic school to meet them by simple denial or utter silence. They are indeed extremely distasteful to that school, and are totally irreconcilable with their teleological cosmology. We must therefore take especial care to place them in their true light. We are entirely of the opinion of Huxley, who, in his able "Evidence as to Man's Place in Nature," says that these facts, "though ignored by many of the professed instructors of the public mind, are easy of demonstration, and are universally agreed to by men of science; while their significance is so great, that whoso has deeply pondered over them will, I think, find little to startle him in the other revelations of biology."

Although our chief inquiry is primarily directed to the history of the evolution of the bodily form of man and of his organs, and to their external and internal structural relations, I must here at once observe that the history of the evolution of the functions is inseparably connected with this. Everywhere in anthropology, just as in zoology, of which the former is but a part, and throughout the whole field of biology, these two branches of research are thus inseparably connected. The peculiar form of the organism and its organs, both internal and external, is always closely related to the peculiar manifestations of life, of the

organism and its organs, or, in other words, to the physiological functions performed by these. This intimate relation between form and function is also shown in the evolution of the organism and its various parts. The history of the evolution of forms, which primarily occupies us, is at the same time the history of the evolution of functions; and this is equally true of the human and of all other organisms.

But I must here add at once, that our knowledge of the evolution of functions is as yet far from being so advanced as our knowledge of the evolution of forms. Indeed, properly speaking, the entire history of evolution, or biogeny, including both Ontogeny and Phylogeny, has as yet been almost exclusively a history of the evolution of forms, while the biogeny of functions hardly exists even in name. The fault lies solely with physiology, which has as yet scarcely given a thought to the history of evolution, which it has left entirely to the care of morphology.

The two chief divisions of biological research—morphology and physiology—have long traveled apart, taking different paths. This is perfectly natural, for the aims, as well as the methods, of the two divisions are different. Morphology, the science of forms, aims at a scientific understanding of organic structures, of their internal and external proportions of form. Physiology, the science of functions, on the other hand, aims at a knowledge of the functions of organs, or, in other words, of the manifestations of life. Physiology, however, has, especially during the last twenty years, been far more one-sided in its progress than morphology. Not only has it entirely neglected to apply the comparative method, by which morphology has gained its greatest results, but it has altogether disregarded the History of Evolution. Hence it has come to pass that, within the past few decades, morphology has advanced far beyond physiology, although the latter is pleased to look haughtily down upon the former. It is morphology which has gained the greatest results in the fields of comparative anatomy and biogeny, and almost everything stated in these pages as to the History of the Evolution of Man, is due to the exertions of morphologists, and not of physiologists. Indeed the direction at present taken by physiology is so one-sided that it has even neglected the recognition of the most important functions of evolution, namely, heredity and adaptation, and has left this entirely physiological task to morphologists. We owe to morphologists, and not to physiologists, nearly all that we yet know of heredity and adaptation. The latter still works as little at the functions of evolution as at the evolution of the functions.

It will, therefore, be the task of a future physiogeny to grasp the history of the evolution of the functions with the same earnestness, and with the same success, with which morphogeny has long ago undertaken the study of the history of the evolution of forms. A few instances will show how closely the two are connected. The heart of the human embryo has at first a very simple structure, such as appears permanently only in ascidians and other inferior worms, and connected with it is a circulation of the blood of the most simple kind. When, on the other hand, we see that with the fully developed form of the human heart there is connected a function of the circulation of the blood totally different from the former one, and far more complicated, the study of the evolution of the heart necessarily enlarges from a task which was originally morphological to one which is physiological also. It is the same in the case of all other organs and their activities.

Thus, for instance, a careful comparative study of the history of the evolution of the form of the intestinal canal, the lungs, and the organs of generation, affords us also most important information as to the evolution of the respective functions of these organs.

This important relation is most clearly seen in the history of the evolution of the nervous system. In the economy of the human body, this system performs the functions of sensation, of voluntary movement, volition, and finally the highest psychical functions, namely, those of thought; in a word, every one of the various activities which constitute the special subject of psychology, or the science of the mind. Modern anatomy and physiology have demonstrated that these functions of the mind, or psychic activities, are immediately dependent upon the more delicate structure of the central nervous system, upon the internal conditions of the form of the brain and the spinal marrow. Here are placed the extremely complex mechanism of cells, whose physiological function constitutes the mind-life of man. It is so complex that to most people its function appears to be something supernatural and incapable of mechanical explanation. But the history of the evolution of the individual furnishes us with the most surprising and significant information as to the gradual origin and progressive formation of this most important system of organs. For the first rudiment of the central nervous system in the human embryo makes its appearance in the same most simple form in which ascidians and other inferior worms retain it throughout life. A perfectly simple spinal marrow, without brain, such as throughout its existence represents the organ of the mind of the

amphioxus, the lowest of vertebrates, first develops from this rudiment. It is only at a later period that a brain develops from the anterior extremity of this spinal cord, and this brain is of the simplest form, similar to the permanent form of this organ in the lower fishes. Step by step this simple brain develops still further, passing through forms corresponding to those of the amphibia, beaked animals (*Ornithostoma*), pouched animals, or marsupials, and semi-apes (*Prosimiae*), until the highly organized form is reached which distinguishes the apes from all other vertebrates, and which finally attains its highest development in the human brain. But step by step with this progressive evolution of the form of the brain, the evolution of its peculiar function, the psychical activities, moves on hand in hand, and it is therefore the history of the evolution of the central nervous system which for the first time enables us to understand the origin of life of the human mind from natural causes, and the gradual historic development of the psychic activities of man. It is impossible without the aid of Ontogeny to perceive how these highest and most brilliant functions of the animal organism have been historically developed. In a word, the history of the evolution of the spinal marrow and the brain of the human embryo at the same time directly leads us to understand the Phylogeny of the human mind, that most sublime activity of life which in the developed human being we are accustomed to regard as something wonderful and supernatural.

There is no doubt that this special result of the study of the history of evolution is among the greatest and most important. Happily, our knowledge of the Ontogeny of the central nervous system of man is so satisfactory, and agrees so perfectly with the supplementary results of comparative anatomy and physiology, that it affords us a perfectly clear insight into one of the highest problems of philosophy, namely, the Phylogeny of the psyche, the mind, or the history of the ancestral lineage of man's psychic activities, and leads us into the only path by which we shall ever be able to solve this the highest of all problems.

PHYSICS AND CHEMISTRY

HERMANN VON HELMHOLTZ

HERMANN HELMHOLTZ was born at Potsdam, Prussia, Aug. 31, 1821. He received his degree in medicine from Berlin in 1842, and was a surgeon in the army until 1847. In this year he published his famous memoir on the "Conservation of Energy" which we give below. In this he traces incidentally the history of the idea as developed by Mayer, Joule and himself, and we need not repeat it here.

He was made Professor of Physiology and General Pathology at Koenigsberg in 1850. In 1851 he invented the ophthalmoscope. In 1855 he was appointed Professor at Bonn and in 1859 took the chair of Physiology at Heidelberg.

His investigations in the subject of sight were famous and he now took up the question of the mechanical causes of vocal sounds and did much to clear up that subject.

In 1871 he was called to be Professor of Physics at Berlin. He was given his title of nobility, "von Helmholtz," in 1883. He died Sept. 8, 1894.

The theory of the conservation of energy which he helped to develop and prove is one of the widest and most important generalizations known in science.

THE CONSERVATION OF ENERGY

A new conquest of very general interest has been recently made by natural philosophy. In the following pages I will endeavour to give a notion of the nature of this conquest. It has reference to a new and universal natural law, which rules the action of natural forces in their mutual relations towards each other, and is as influential on our theoretic views of natural processes as it is important in their technical applications.

Among the practical arts which owe their progress to the development of the natural sciences, from the conclusion of the middle ages downwards, practical mechanics, aided by the mathematical science which bears the same name, was one of the most prominent. The character of the art was, at the time referred to, naturally very different from its present one. Surprised and stimulated by its own success, it thought no problem beyond its power, and immediately attacked some of the most difficult and complicated. Thus it was attempted to build automaton figures which should perform the functions of men and animals. The wonder of the last century was Vaucanson's duck, which fed and digested its food; the flute player of the same artist, which moved all its fingers correctly; the writing boy of the older, and the pianoforte player of the younger Droz: which latter, when performing, followed its hands with its eyes, and at the conclusion of the piece bowed courteously to the audience. That men like those mentioned, whose talent might bear comparison with the most inventive heads of the present age, should spend so much time in the construction of these figures, which we at present regard as the merest trifles, would be incomprehensible, if they had not hoped in solemn earnest to solve a great problem. The writing boy of the elder Droz was publicly exhibited in Germany some years ago. Its wheel-work is so complicated, that no ordinary head would be sufficient to decipher its manner of action. When, however, we are informed that this boy and its constructor, being suspected of the black art, lay for a time in the Spanish Inquisition, and with difficulty obtained their freedom, we may infer that in those days even such a toy appeared great enough to excite doubts as to its natural origin. And though these artists may not have hoped to breathe into the creature of their ingenuity a soul gifted with moral completeness, still

there were many who would be willing to dispense with the moral qualities of their servants if, at the same time, their immoral qualities could also be got rid of; and accept, instead of the mutability of flesh and bones, services which should combine the regularity of a machine with the durability of brass and steel. The object, therefore, which the inventive genius of the past century placed before it with the fullest earnestness, and not as a piece of amusement merely, was boldly chosen, and was followed up with an expenditure of sagacity which has contributed not a little to enrich the mechanical experience which a later time knew how to take advantage of. We no longer seek to build machines which shall fulfill the thousand services required of one man, but desire, on the contrary, that a machine shall perform one service, but shall occupy in doing it the place of a thousand men.

From these efforts to imitate living creatures, another idea, also by a misunderstanding, seems to have developed itself, which, as it were, formed the new philosopher's stone of the seventeenth and eighteenth centuries. It was now the endeavour to construct a perpetual motion. Under this term was understood a machine which, without being wound up, without consuming in the working of it, falling water, wind or any other natural force, should still continue in motion, the motive power being perpetually supplied by the machine itself. Beasts and human beings seemed to correspond to the idea of such an apparatus, for they moved themselves energetically and incessantly as long as they lived, were never wound up, and nobody set them in motion. A connection between the taking in of nourishment and the development of force did not make itself apparent. The nourishment seemed only necessary to grease, as it were, the wheel-work of the animal machine, to replace what was used up, and to renew the old. The development of force out of itself seemed to be the essential peculiarity, the real quintessence of organic life. If, therefore, men were to be constructed, a perpetual motion must first be found.

Another hope also seemed to take up incidentally the second place, which, in our wiser age, would certainly have claimed the first rank in the thoughts of men. The perpetual motion was to produce work inexhaustibly without corresponding consumption, that is to say, out of nothing. Work, however, is money. Here, therefore, the practical problem which the cunning heads of all centuries have followed in the most diverse ways, namely, to fabricate money out of nothing, invited solution. The similarity with the philosopher's stone sought by the ancient

chemists was complete. That also was thought to contain the quintessence of organic life, and to be capable of producing gold.

The spur which drove men to inquiry was sharp, and the talent of some of the seekers must not be estimated as small. The nature of the problem was quite calculated to entice poring brains, to lead them round a circle for years, deceiving ever with new expectations, which vanished upon nearer approach, and finally reducing these dupes of hope to open insanity. The phantom could not be grasped. It would be impossible to give a history of these efforts, as the clearer heads, among whom the elder Droz must be ranked, convinced themselves of the futility of their experiments, and were naturally not inclined to speak much about them. Bewildered intellects, however, proclaimed often enough that they had discovered the grand secret; and as the incorrectness of their proceedings was always speedily manifest, the matter fell into bad repute, and the opinion strengthened itself more and more that the problem was not capable of solution; one difficulty after another was brought under the dominion of mathematical mechanics, and finally a point was reached where it could be proved that, at least by the use of pure mechanical forces, no perpetual motion could be generated.

We have here arrived at the idea of the driving force or power of a machine, and shall have much to do with it in future. I must, therefore, give an explanation of it. The idea of work is evidently transferred to machines by comparing their arrangements with those of men and animals to replace which they were applied. We still reckon the work of steam engines according to horse-power. The value of manual labor is determined partly by the force which is expended in it (a strong laborer is valued more highly than a weak one), partly, however, by the skill which is brought into action. A machine, on the contrary, which executes work skilfully, can always be multiplied to any extent; hence its skill has not the high value of human skill in domains where the latter cannot be supplied by machines. Thus the idea of the quantity of work in the case of machines has been limited to the consideration of the expenditure of force; this was the more important, as indeed most machines are constructed for the express purpose of exceeding, by the magnitude of their effects, the powers of men and animals. Hence, in a mechanical sense, the idea of work is become identical with that of the expenditure of force, and in this way I will apply it.

How, then, can we measure this expenditure, and compare it in the case of different machines?

I must here conduct you a portion of the way—as short a portion as possible—over the uninviting field of mathematico-mechanical ideas, in order to bring you to a point of view from which a more rewarding prospect will open. And though the example which I shall here choose, namely, that of a water-mill with iron hammer, appears to be tolerably romantic, still, alas, I must leave the dark forest valley, the spark-emitting anvil, and the black Cyclops wholly out of sight, and beg a moment's attention to the less poetic side of the question, namely, the machinery. This is driven by a water-wheel, which in its turn is set in motion by the falling water. The axle of the water-wheel has at certain places small projections, thumbs, which, during the rotation, lift the heavy hammer and permit it to fall again. The falling hammer belabors the mass of metal, which is introduced beneath it. The work therefore done by the machine consists, in this case, in the lifting of the hammer, to do which the gravity of the latter must be overcome. The expenditure of force will, in the first place, other circumstances being equal, be proportioned to the weight of the hammer; it will, for example, be double when the weight of the hammer is doubled. But the action of the hammer depends not upon its weight alone, but also upon the height from which it falls. If it falls through two feet, it will produce a greater effect than if it falls through only one foot. It is, however, clear that if the machine, with a certain expenditure of force, lifts the hammer a foot in height, the same amount of force must be expended to raise it a second foot in height. The work is therefore not only doubled when the weight of the hammer is increased twofold, but also when the space through which it falls is doubled. From this it is easy to see that the work must be measured by the product of the weight into the space through which it ascends. And in this way, indeed, do we measure in mechanics.

The unit of work is a foot-pound, that is, a pound weight, raised to the height of one foot.

While the work in this case consists in the raising of the heavy hammer-head, the driving force which sets the latter in motion is generated by falling water. It is not necessary that the water should fall vertically, it can also flow in a moderately inclined bed; but it must always, where it has water-mills to set in motion, move from a higher to a lower position. Experiment and theory coincide in teaching, that when a hammer of a hundred weight is to be raised one foot, to accomplish this at least a hundred weight of water must fall through the space of one foot; or what is equivalent to this, two hundred weight must fall

full half a foot, or four hundred weight a quarter of a foot, etc. In short, if we multiply the weight of the falling water by the height through which it falls, and regard, as before, the product as the measure of the work, then the work performed by the machine in raising the hammer can, in the most favourable case, be only equal to the number of foot-pounds of water which have fallen in the same time. In practice, indeed, this ratio is by no means attained; a great portion of the work of the falling water escapes unused, inasmuch as part of the force is willingly sacrificed for the sake of obtaining greater speed.

I will further remark, that this relation remains unchanged whether the hammer is driven immediately by the axle of the wheel, or whether—by the intervention of wheel-work, endless screws, pulleys, ropes—the motion is transferred to the hammer. We may, indeed, by such arrangements, succeed in raising a hammer of ten hundred weight, when by the first simple arrangement, the elevation of a hammer of one hundred weight might alone be possible; but either this heavier hammer is raised to only one-tenth of the height, or tenfold the time is required to raise it to the same height; so that, however we may alter, by the interposition of machinery, the intensity of the acting force, still in a certain time, during which the mill-stream furnishes us with a definite quantity of water, a certain definite quantity of work, and no more, can be performed.

Our machinery, therefore, has, in the first place, done nothing more than make use of the gravity of the falling water in order to overpower the gravity of the hammer, and to raise the latter. When it has lifted the hammer to the necessary height, it again liberates it, and the hammer falls upon the metal mass which is pushed beneath it. But why does the falling hammer here exercise a greater force than when it is permitted simply to press with its own weight on the mass of metal? Why is its power greater as the height from which it falls is increased? We find, in fact, that the work performed by the hammer is determined by its velocity. In other cases, also, the velocity of moving masses is a means of producing great effects. I only remind you of the destructive effects of musket-bullets, which, in a state of rest, are the most harmless things in the world. I remind you of the wind-mill, which derives its force from the moving air. It may appear surprising that motion, which we are accustomed to regard as a non-essential and transitory endowment of bodies, can produce such great effects. But the fact is, that motion appears to us, under ordinary circumstances, transitory, because the

movement of all terrestrial bodies is resisted perpetually by other forces, friction, resistance of the air, etc., so that motion is incessantly weakened and finally neutralized. A body, however, which is opposed by no resisting force, when once set in motion, moves onward eternally with undiminished velocity. Thus we know that the planetary bodies have moved without change, through space, for thousands of years. Only by resisting forces can motion be diminished or destroyed. A moving body, such as the hammer or the musket-ball, when it strikes against another, presses the latter together, or penetrates it, until the sum of the resisting forces which the body struck presents to its pressure, or to the separation of its particles, is sufficiently great to destroy the motion of the hammer or of the bullet. The motion of a mass regarded as taking the place of working force is called the living force (*vis viva*) of the mass. The word "living" has of course here no reference whatever to living beings, but is intended to represent solely the force of the motion as distinguished from the state of unchanged rest—from the gravity of a motionless body, for example, which produces an incessant pressure against the surface which supports it, but does not produce any motion.

In the case before us, therefore, we had first power in the form of a falling mass of water, then in the form of a lifted hammer, and, thirdly, in the form of the living force of the fallen hammer. We should transform the third form into the second, if we, for example, permitted the hammer to fall upon a highly elastic steel beam strong enough to resist the shock. The hammer would rebound, and in the most favourable case would reach a height equal to that from which it fell, but would never rise higher. In this way its mass would ascend: and at the moment when its highest point has been attained, it would represent the same number of raised foot-pounds as before it fell, never a greater number; that is to say, living force can generate the same amount of work as that expended in its production. It is therefore equivalent to this quantity of work.

Our clocks are driven by means of sinking weights, and our watches by means of the tension of springs. A weight which lies on the ground, an elastic spring which is without tension, can produce no effects; to obtain such we must first raise the weight or impart tension to the spring, which is accomplished when we wind up our clocks and watches. The man who winds the clock or watch communicates to the weight or to the spring a certain amount of power, and exactly so much as is thus communicated is gradually given out again during the following twenty-

four hours, the original force being thus slowly consumed to overcome the friction of the wheels and the resistance which the pendulum encounters from the air. The wheel-work of the clock therefore exhibits no working force which was not previously communicated to it, but simply distributes the force given to it uniformly over a longer time.

Into the chamber of an air-gun we squeeze, by means of a condensing air-pump, a great quantity of air. When we afterwards open the cock of a gun and admit the compressed air into the barrel, the ball is driven out of the latter with a force similar to that exerted by ignited powder. Now we may determine the work consumed in the pumping-in of the air, and the living force which, upon firing, is communicated to the ball, but we shall never find the latter greater than the former. The compressed air has generated no working force, but simply gives to the bullet that which has been previously communicated to it. And while we have pumped for perhaps a quarter of an hour to charge the gun, the force is expended in a few seconds when the bullet is discharged; but because the action is compressed into so short a time, a much greater velocity is imparted to the ball than would be possible to communicate to it by the unaided effort of the arm in throwing it.

From these examples you observe, and the mathematical theory has corroborated this for all purely mechanical, that is to say, for moving forces, that all our machinery and apparatus generate no force, but simply yield up the power communicated to them by natural forces—falling water, moving wind, or by the muscles of men and animals. After this law had been established by the great mathematicians of the last century, a perpetual motion, which should make only use of pure mechanical forces, such as gravity, elasticity, pressure of liquids and gases, could only be sought after by bewildered and ill-instructed people. But there are still other natural forces which are not reckoned among the purely moving forces—heat, electricity, magnetism, light, chemical forces, all of which nevertheless stand in manifold relation to mechanical processes. There is hardly a natural process to be found which is not accompanied by mechanical actions, or from which mechanical work may not be derived. Here the question of a perpetual motion remained open; the decision of this question marks the progress of modern physics.

In the case of the air-gun, the work to be accomplished in the propulsion of the ball was given by the arm of the man who pumped in the air. In ordinary firearms, the condensed mass of air which propels the bullet is obtained in a totally different manner, namely, by the combus-

tion of the powder. Gunpowder is transformed by combustion for the most part into gaseous products, which endeavor to occupy a much larger space than that previously taken by the volume of the powder. Thus, you see, that, by the use of gunpowder, the work which the human arm must accomplish in the case of the air-gun is spared.

In the mightiest of our machines, the steam engine, it is a strongly compressed aeriform body, water, vapour, which, by its effort to expand, sets the machine in motion. Here, also, we do not condense the steam by means of an external mechanical force, but by communicating heat to a mass of water in a closed boiler, we change this water into steam, which, in consequence of the limits of the space, is developed under strong pressure. In this case, therefore, it is the heat communicated which generates the mechanical force. The heat thus necessary for the machine we might obtain in many ways; the ordinary method is to procure it from the combustion of coal.

Combustion is a chemical process. A particular constituent of our atmosphere, oxygen, possesses a strong force of attraction, or, as it is named in chemistry, a strong affinity for the constituents of the combustible body, which affinity, however, in most cases, can only exert itself at high temperatures. As soon as a portion of the combustible body, for example, the coal, is sufficiently heated, the carbon unites itself with great violence to the oxygen of the atmosphere and forms a peculiar gas, carbonic acid, the same which we see foaming from beer and champagne. By this combination, light and heat are generated; heat is generally developed by any combination of two bodies of strong affinity for each other; and when the heat is intense enough, light appears. Hence, in the steam engine, it is chemical processes and chemical forces which produce the astonishing work of these machines. In like manner the combustion of gunpowder is a chemical process which, in the barrel of the gun, communicates living force to the bullet.

While now the steam engine develops for us mechanical work out of heat, we can conversely generate heat by mechanical forces. A skilful blacksmith can render an iron wedge red hot by hammering. The axles of our carriages must be protected, by careful greasing, from ignition through friction. Even lately this property has been applied on a large scale. In some factories, where a surplus of water power is at hand, this surplus is applied to cause a strong iron plate to rotate swiftly upon another, so that they become strongly heated by the friction. The heat so obtained warms the room, and thus a stove without fuel is provided.

Now, could not the heat generated by the plates be applied to a small steam engine, which in its turn should be able to keep the rubbing plates in motion? The perpetual motion would thus be at length found. This question might be asked, and could not be decided by the older mathematico-mechanical investigations. I will remark, beforehand, that the general law which I will lay before you answers the question in the negative.

By a similar plan, however, a speculative American set some time ago the industrial world of Europe in excitement. The magneto-electric machines often made use of in the case of rheumatic disorders are well known to the public. By imparting a swift rotation to the magnet of such a machine, we obtain powerful currents of electricity. If those be conducted through water, the latter will be reduced into its two components, oxygen and hydrogen. By the combustion of hydrogen, water is again generated. If this combustion takes place, not in atmospheric air, of which oxygen only constitutes a fifth part, but in pure oxygen, and if a bit of chalk be placed in the flame, the chalk will be raised to a white heat, and give us the sun-like Drummond's light. At the same time, the flame develops a considerable quantity of heat. Our American proposed to utilize in this way the gases obtained from electrolytic decomposition, and asserted that by the combustion a sufficient amount of heat was generated to keep a small steam engine in action, which again drove his magneto-electric machine, decomposed the water, and thus continually prepared its own fuel. This would certainly have been the most splendid of all discoveries; a perpetual motion which, besides the force which kept it going, generated light like the sun, and warmed all around it. The matter was by no means badly cogitated. Each practical step in the affair was known to be possible; but those who at that time were acquainted with the physical investigations which bear upon this subject could have affirmed, on the first hearing the report, that the matter was to be numbered among the numerous stories of the fable-rich America; and indeed a fable it remained.

It is not necessary to multiply examples further. You will infer from those given, in what immediate connection heat, electricity, magnetism, light, and chemical affinity, stand with mechanical forces.

Starting from each of these different manifestations of natural forces, we can set every other in motion, for the most part not in one way merely, but in many ways. It is here as with the weaver's web—

> Where a step stirs a thousand threads
> The shuttles shoot from side to side,
> The fibres flow unseen,
> And one shock strikes a thousand combinations.

Now it is clear that if by any means we could succeed, as the above American professed to have done, by mechanical forces, to excite chemical, electrical, or other natural processes, which, by any circuit whatever, and without altering permanently the active masses in the machine, could produce mechanical force in greater quantity than that at first applied, a portion of the work thus gained might be made use of to keep the machine in motion, while the rest of the work might be applied to any other purpose whatever. The problem was, to find in the complicated net of reciprocal actions, a track through chemical, electrical, magnetical, and thermic processes, back to mechanical actions, which might be followed with a final gain of mechanical work; thus would the perpetual motion be found.

But, warned by the futility of former experiments, the public had become wiser. On the whole, people did not seek much after combinations which promised to furnish a perpetual motion, but the question was inverted. It was no more asked, How can I make use of the known and unknown relations of natural forces so as to construct a perpetual motion? but it was asked, If a perpetual motion be impossible, what are the relations which must subsist between natural forces? Everything was gained by this inversion of the question. The relations of natural forces rendered necessary by the above assumption, might be easily and completely stated. It was found that all known relations of force harmonize with the consequences of that assumption, and a series of unknown relations were discovered at the same time, the correctness of which remained to be proved. If a single one of them could be proved false, then a perpetual motion would be possible.

The first who endeavoured to travel this way was a Frenchman, named Carnot, in the year 1824. In spite of a too limited conception of his subject, and an incorrect view as to the nature of heat, which led him to some erroneous conclusions, his experiment was not quite unsuccessful. He discovered a law which now bears his name, and to which I will return further on.

His labors remained for a long time without notice, and it was not till eighteen years afterwards, that is, in 1842, that different investigators in different countries, and independent of Carnot, laid hold of the same thought.

The first who saw truly the general law here referred to, and expressed it correctly, was a German physician, J. R. Mayer, of Heilbronn, in the year 1842. A little later, in 1843, a Dane, named Colding, pre-

sented a memoir to the Academy of Copenhagen, in which the same law found utterance, and some experiments were described for its further corroboration. In England, Joule began about the same time to make experiments having reference to the same subject. We often find, in the case of questions to the solution of which the development of science points, that several heads, quite independent of each other, generate exactly the same series of reflections.

I myself, without being acquainted with either Mayer or Colding, and having first made the acquaintance of Joule's experiments at the end of my investigation, followed the same path. I endeavoured to ascertain all the relations between the different natural processes, which followed from our regarding them from the above point of view. My inquiry was made public in 1847, in a small pamphlet bearing the title, "On the Conservation of Force."

Since that time the interest of the scientific public for this subject has gradually augmented. A great number of the essential consequences of the above manner of viewing the subject, the proof of which was wanting when the first theoretic notions were published, have since been confirmed by experiment, particularly by those of Joule; and during the last year the most eminent physicist of France, Regnault, has adopted the new mode regarding the question, and by fresh investigations on the specific heat of gases has contributed much to its support. For some important consequences the experimental proof is still wanting, but the number of confirmations is so predominant, that I have not deemed it too early to bring the subject before even a non-scientific audience.

How the question has been decided you may already infer from what has been stated. In the series of natural processes there is no circuit to be found, by which mechanical force can be gained without a corresponding consumption. The perpetual motion remains impossible. Our reflections, however, gain thereby a higher interest.

We have thus far regarded the development of force by natural processes, only in its relation to its usefulness to man, as mechanical force. You now see that we have arrived at a general law, which holds good wholly independent of the application which man makes of natural forces; we must therefore make the expression of our new law correspond to this more general significance. It is in the first place clear, that the work which, by any natural process whatever, is performed under favourable conditions by a machine, and which may be measured

in the way already indicated, may be used as a measure of force common to all. Further, the important question arises, "If the quantity of force cannot be augmented except by corresponding consumption, can it be diminished or lost? For the purpose of our machines it certainly can, if we neglect the opportunity to convert natural processes to use, but as investigation has proved, not for a nature as a whole."

In the collision and friction of bodies against each other, the mechanics of former years assumed simply that living force was lost. But I have already stated that each collision and each act of friction generates heat; and, moreover, Joule has established by experiment the important law that for every foot-pound of force which is lost a definite quantity of heat is always generated, and that when work is performed by the consumption of heat, for each foot-pound thus gained a definite quantity of heat disappears. The quantity of heat necessary to raise the temperature of a pound of water a degree of the centigrade thermometer, corresponds to a mechanical force by which a pound weight would be raised to the height of 1350 feet; we name this quantity the mechanical equivalent of heat. I may mention here that these facts conduct of necessity to the conclusion, that the heat is not, as was formerly imagined, a fine imponderable substance, but that, like light, it is a peculiar shivering motion of the ultimate particles of bodies. In collision and friction, according to this manner of viewing the subject, the motion of the mass of a body which is apparently lost is converted into a motion of the ultimate particles of the body; and conversely, when mechanical force is generated by heat, the motion of the ultimate particles is converted into a motion of the mass.

Chemical combinations generate heat, and the quantity of this heat is totally independent of the time and steps through which the combination has been effected, provided that other actions are not at the same time brought into play. If, however, mechanical work is at the same time accomplished, as in the case of the steam engine, we obtain as much less heat as is equivalent to this work. The quantity of work produced by chemical force is in general very great. A pound of the purest coal gives, when burnt, sufficient heat to raise the temperature of 8086 pounds of water one degree of the centigrade thermometer; from this we can calculate that the magnitude of the chemical force of attraction between the particles of a pound of coal and the quantity of oxygen that corresponds to it is capable of lifting a weight of one hundred pounds to a height of twenty miles. Unfortunately, in our steam

engines, we have hitherto been able to gain only the smallest portion of this work; the greater part is lost in the shape of heat. The best expansive engines give back as mechanical work only eighteen per cent. of the heat generated by the fuel.

From a similar investigation of all the other known physical and chemical processes, we arrive at the conclusion that Nature as a whole possesses a store of force which cannot in any way be either increased or diminished. And that, therefore, the quantity of force in nature is just as eternal and unalterable as the quantity of matter. Expressed in this form, I have named the general law "The Principle of the Conservation of Force."

We cannot create mechanical force, but we may help ourselves from the general store-house of Nature. The brook and the wind, which drive our mills, the forest and the coal-bed, which supply our steam engines and warm our rooms, are to us the bearers of a small portion of the great natural supply which we draw upon for our purposes, and the actions of which we can apply as we think fit. The possessor of a mill claims the gravity of the descending rivulet, or the living force of the moving wind, as his possession. These portions of the store of Nature are what give his property its chief value.

Further, from the fact that no portion of force can be absolutely lost, it does not follow that a portion may not be inapplicable to human purposes. In this respect the inferences drawn by William Thomson from the law of Carnot are of importance. This law, which was discovered by Carnot during his endeavours to ascertain the relations between heat and mechanical force, which, however, by no means belongs to the necessary consequences of the conservation of force, and which Clausius was the first to modify in such a manner that it no longer contradicted the above general law, expresses a certain relation between the compressibility, the capacity for heat, and the expansion by heat of all bodies. It is not yet considered as actually proved, but some remarkable deductions having been drawn from it, and afterwards proved to be facts by experiment, it has attained thereby a great degree of probability. Besides the mathematical form in which the law was first expressed by Carnot, we can give it the following more general expression:—"Only when heat passes from a warmer to a colder body, and even then only partially, can it be converted into mechanical work."

The heat of a body which we cannot cool further, cannot be changed into another form of force; into the electric or chemical force, for ex-

ample. Thus, in our steam engines, we convert a portion of the heat of the glowing coal into work, by permitting it to pass to the less warm water of the boiler. If, however, all the bodies in nature had the same temperature, it would be impossible to convert any portion of their heat into mechanical work. According to this, we can divide the total force store of the universe into two parts, one of which is heat, and must continue to be such; the other, to which a portion of the heat of the warmer bodies, and the total supply of chemical, mechanical, electrical, and magnetical forces belong, is capable of the most varied changes of form, and constitutes the whole wealth of change which takes place in nature.

But the heat of the warmer bodies strives perpetually to pass to bodies less warm by radition and conduction, and thus to establish an equilibrium of temperature. At each motion of a terrestrial body, a portion of mechanical force passes by friction or collision into heat, of which only a part can be converted back again into mechanical force. This is also generally the case in every electrical and chemical process. From this, it follows that the first portion of the store of force, the unchangeable heat, is augmented by every natural process, while the second portion, mechanical, electrical, and chemical force, must be diminished; so that if the universe be delivered over to the undisturbed action of its physical processes, all force will finally pass into the form of heat, and all heat come into a state of equilibrium. Then all possibility of a further change would be at an end, and the complete cessation of all natural processes must set in. The life of men, animals, and plants, could not of course continue if the sun had lost its high temperature, and with it his light,—if all the components of the earth's surface had closed those combinations which their affinities demand. In short, the universe from that time forward would be condemned to a state of eternal rest.

These consequences of the law of Carnot are, of course, only valid, provided that the law, when sufficiently tested, proves to be universally correct. In the mean time there is little prospect of the law being proved incorrect. At all events we must admire the sagacity of Thomson, who, in the letters of a long known little mathematical formula, which only speaks of the heat, volume, and pressure of bodies, was able to discern consequences which threatened the universe, though certainly after an infinite period of time, with eternal death.

I have already given you notice that our path lay through a thorny

and unrefreshing field of mathematico-mechanical developments. We have now left this portion of our road behind us. The general principle which I have sought to lay before you has conducted us to a point from which our view is a wide one, and aided by this principle, we can now at pleasure regard this or the other side of the surrounding world, according as our interest in the matter leads us. A glance into the narrow laboratory of the physicist, with its small appliances and complicated abstractions, will not be so attractive as a glance at the wide heaven above us, the clouds, the rivers, the woods, and the living beings around us. While regarding the laws which have been deduced from the physical processes of terrestrial bodies, as applicable also to the heavenly bodies, let me remind you that the same force which, acting at the earth's surface, we call gravity (*Schwere*), acts as gravitation in the celestial spaces, and also manifests its power in the motion of the immeasurably distant double stars which are governed by exactly the same laws as those subsisting between the earth and moon; that, therefore, the light and heat of terrestrial bodies do not in any way differ essentially from those of the sun, or of the most distant fixed star; that the meteoric stones which sometimes fall from external space upon the earth are composed of exactly the same simple chemical substances as those with which we are acquainted. We need, therefore, feel no scruple in granting that general laws to which all terrestrial natural processes are subject, are also valid for other bodies than the earth. We will, therefore, make use of our law to glance over the household of the universe with respect to the store of force, capable of action, which it possesses.

A number of singular peculiarities in the structure of our planetary system indicate that it was once a connected mass with a uniform motion of rotation. Without such an assumption, it is impossible to explain why all the planets move in the same direction round the sun, why they all rotate in the same direction round their axes, why the planes of their orbits, and those of their satellites and rings all nearly coincide, why all their orbits differ but little from circles; and much besides. From these remaining indications of a former state, astronomers have shaped an hypothesis regarding the formation of our planetary system, which, although from the nature of the case it must ever remain an hypothesis, still in its special traits is so well supported by analogy, that it certainly deserves our attention. It was Kant, who, feeling great interest in the physical description of the earth and the planetary system, undertook

the labour of studying the works of Newton, and as an evidence of the depth to which he had penetrated into the fundamental ideas of Newton, seized the notion that the same attractive force of all ponderable matter which now supports the motion of the planets, must also aforetime have been able to form from matter loosely scattered in space the planetary system. Afterwards, and independent of Kant, Laplace, the great author of the *Mecanique Celeste*, laid hold of the same thought, and introduced it among astronomers.

The commencement of our planetary system, including the sun, must, according to this, be regarded as an immense nebulous mass which filled the portion of space which is now occupied by our system, far beyond the limits of Neptune, our most distant planet. Even now we perhaps see similar masses in the distant regions of the firmament, as patches of nebulæ, and nebulous stars; within our system also, comets, the zodiacal light, the corona of the sun during a total eclipse, exhibit remnants of a nebulous substance, which is so thin that the light of the stars passes through it unenfeebled and unrefracted. If we calculate the density of the mass of our planetary system, according to the above assumption, for the time when it was a nebulous sphere, which reached to the path of the outmost planet, we should find that it would require several cubic miles of such matter to weight a single grain.

The general attractive force of all matter must, however, impel these masses to approach each other, and to condense, so that the nebulous sphere became incessantly smaller, by which, according to mechanical laws, a motion of rotation originally slow, and the existence of which must be assumed, would gradually become quicker and quicker. By the centrifugal force which must act most energetically in the neighbourhood of the equator of the nebulous sphere, masses could from time to time be torn away, which afterwards would continue their courses separate from the main mass, forming themselves into single planets, or, similar to the great original sphere, into planets with satellites and rings, until finally the principal mass condensed itself into the sun. With regard to the origin of heat and light, this view gives us no information.

When the nebulous chaos first separated itself from other fixed star masses, it must not only have contained all kinds of matter which was to constitute the future planetary system, but also, in accordance with our new law, the whole store of force which at one time must unfold therein its wealth of actions. Indeed in this respect an immense

dower was bestowed in the shape of the general attraction of all the particles for each other. This force, which on the earth exerts itself as gravity, acts in the heavenly spaces as gravitation. As terrestrial gravity when it draws a weight downwards performs work and generates *vis viva,* so also the heavenly bodies do the same when they draw two portions of matter from distant regions of space towards each other.

The chemical forces must have been also present, ready to act; but as these forces can only come into operation by the most intimate contact of the different masses, condensation must have taken place before the play of chemical forces began.

Whether a still further supply of force in the shape of heat was present at the commencement we do not know. At all events, by aid of the law of the equivalence of heat and work, we find in the mechanical forces, existing at the time to which we refer, such a rich source of heat and light, that there is no necessity whatever to take refuge in the idea of a store of these forces originally existing. When through condensation of the masses their particles came into collision, and clung to each other, the *vis viva* of their motion would be thereby annihilated, and must reappear as heat. Already in old theories, it has been calculated that cosmical masses must generate heat by their collision, but it was far from anybody's thought to make even a guess at the amount of heat to be generated in this way. At present we can give definite numerical values with certainty.

Let us make this addition to our assumption; that, at the commencement, the density of the nebulous matter was a vanishing quantity, as compared with the present density of the sun and planets; we can then calculate how much work has been performed by the condensation; we can further calculate how much of this work still exists in the form of mechanical force, as attraction of the planets towards the sun, and as *vis viva* of their motion, and find by this how much of the force has been converted into heat.

The result of this calculation is, that only about the 454th part of the original mechanical force remains as such, and that the remainder, converted into heat, would be sufficient to raise a mass of water equal to the sun and planets taken together, not less than twenty-eight millions of degrees of the centigrade scale. For the sake of comparison, I will mention that the highest temperature which we can produce by the oxyhydrogen blowpipe, which is sufficient to fuse and

vaporize even platina, and which but few bodies can endure, is estimated at about two thousand centigrade degrees. Of the action of a temperature of twenty-eight millions of such degrees we can form no notion. If the mass of our entire system were pure coal, by the combustion of the whole of it only the 3500th part of the above quantity would be generated. This is also clear, that such a development of heat must have presented the greatest obstacle to the speedy union of the masses, that the larger part of the heat must have been diffused by radiation into space, before the masses could form bodies possessing the present density of the sun and planets, and that these bodies must once have been in a state of fiery fluidity. This notion is corroborated by the geological phenomena of our planet; and with regard to the other planetary bodies, the flattened form of the sphere, which is the form of equilibrium of a fluid mass, is indicative of a former state of fluidity. If I thus permit an immense quantity of heat to disappear without compensation from our system, the principle of the conservation of force is not thereby invaded. Certainly for our planet it is lost, but not for the universe. It has proceeded outwards, and daily proceeds outwards into infinite space; and we know not whether the medium which transmits the undulations of light and heat possesses an end where the rays must return, or whether they eternally pursue their way through infinitude.

The store of force at present possessed by our system, is also equivalent to immense quantities of heat. If our earth were by a sudden shock brought to rest on her orbit—which is not to be feared in the existing arrangements of our system—by such a shock a quantity of heat would be generated equal to that produced by the combustion of fourteen such earths of solid coal. Making the most unfavourable assumption as to its capacity for heat, that is, placing it equal to that of water, the mass of the earth would thereby be heated 11,200 degrees; it would therefore be quite fused and for the most part reduced to vapour. If, then, the earth, after having been thus brought to rest, should fall into the sun, which of course would be the case, the quantity of heat developed by the shock would be four hundred times greater.

Even now, from time to time, such a process is repeated on a small scale. There can hardly be a doubt that meteors, fire-balls, and meteoric stones are masses which belong to the universe, and before coming into the domain of our earth, moved like the planets round the sun. Only when they enter our atmosphere do they become visible and fall some-

times to the earth. In order to explain the emission of light by these bodies, and the fact that for some time after their descent they are very hot, the friction was long ago thought of which they experience in passing through the air. We can now calculate that a velocity of 3,000 feet a second supposing the whole of the friction to be expended in heating the solid mass, would raise a piece of meteoric iron 1000° C. in temperature, or, in other words, to a vivid red heat. Now the average velocity of the meteors seems to be thirty or forty times the above amount. To compensate this, however, the greater portion of the heat is, doubtless, carried away by the condensed mass of air which the meteor drives before it. It is known that bright meteors generally leave a luminous trail behind them, which probably consists of several portions of the red-hot surfaces. Meteoric masses which fall to the earth often burst with a violent explosion, which may be regarded as a result of the quick heating. The newly-fallen pieces have been for the most part found hot, but not red-hot, which is easily explainable by the circumstance, that during the short time occupied by the meteor in passing through the atmosphere, only a thin, superficial layer is heated to redness, while but a small quantity of heat has been able to penetrate to the interior of the mass. For this reason the red heat can speedily disappear.

Thus has the falling of the meteoric stone, the minute remnant of processes which seems to have played an important part in the formation of the heavenly bodies, conducted us to the present time, where we pass from the darkness of hypothetical views to the brightness of knowledge. In what we have said, however, all that is hypothetical is the assumption of Kant and Laplace, that the masses of our system were once distributed as nebulæ in space.

On account of the rarity of the case, we will still further remark, in what close coincidence the results of science here stand with the earlier legends of the human family, and the forebodings of poetic fancy. The cosmogony of ancient nations generally commences with chaos and darkness.

Neither is the Mosaic tradition very divergent, particularly when we remember that that which Moses names heaven is different from the blue dome above us, and is synonymous with space, and that the unformed earth, and the waters of the great deep, which were afterwards divided into waters above the firmament, and waters below the firmament, resembled the chaotic components of the world.

Our earth bears still the unmistakable traces of its old fiery fluid condition. The granite formations of her mountains exhibit a structure, which can only be produced by the crystallization of fused masses. Investigation still shows that the temperature in mines, and borings, increases as we descend; and if this increase is uniform, at the depth of fifty miles, a heat exists sufficient to fuse all our minerals. Even now our volcanoes project, from time to time, mighty masses of fused rocks from their interior, as a testimony of the heat which exists there. But the cooled crust of the earth has already become so thick, that, as may be shown by calculations of its conductive power, the heat coming to the surface from within, in comparison with that reaching the earth from the sun, is exceedingly small, and increases the temperature of the surface only about one-thirtieth of a degree centigrade; so that the remnant of the old store of force which is enclosed as heat within the bowels of the earth, has a sensible influence upon the processes at the earth's surface, only through the instrumentality of volcanic phenomena. These processes owe their power almost wholly to the action of other heavenly bodies, particularly to the light and heat of the sun. and partly also, in the case of the tides, to the attraction of the sun and moon.

Most varied and numerous are the changes which we owe to the light and heat of the sun. The sun heats our atmosphere irregularly, the warm rarefied air ascends, while fresh cool air flows from the sides to supply its place: in this way winds are generated. This action is most powerful at the equator, the warm air of which incessantly flows in the upper regions of the atmosphere towards the poles: while just as persistently, at the earth's surface, the trade wind carries new and cool air to the equator. Without the heat of the sun all winds must, of necessity, cease. Similar currents are produced by the same cause in the waters of the sea. Their power may be inferred from the influence which in some cases they exert upon climate. By them the warm water of the Antilles is carried to the British Isles, and confers upon them a mild, uniform warmth and rich moisture; while, through similar causes, the floating ice of the North Pole is carried to the coast of Newfoundland, and produces cold. Further, by the heat of the sun, a portion of the water is converted into vapour which rises in the atmosphere, is condensed to clouds, or falls in rain and snow upon the earth, collects in the form of springs, brooks, and rivers, and finally reaches the sea again, after having gnawed the rocks, carried away the light earth,

and thus performed its part in the geologic changes of the earth; perhaps, besides all this it has driven our watermill upon its way. If the heat of the sun were withdrawn, there would remain only a single motion of water, namely, the tides, which are produced by the attraction of the sun and moon.

How is it, now, with the motions and the work of organic beings. To the builders of the automata of the last century, men and animals appeared as clockwork which was never wound up, and created the force which they exerted out of nothing. They did not know how to establish a connection between the nutriment consumed and the work generated. Since, however, we have learned to discern in the steam-engine this origin of mechanical force, we must inquire whether something similar does not hold good with regard to men. Indeed, the continuation of life is dependent on the consumption of nutritive materials: these are combustible substances, which, after digestion and being passed into the blood, actually undergo a slow combustion, and finally enter into almost the same combinations with the oxygen of the atmosphere that are produced in an open fire. As the quantity of heat generated by combustion is independent of the duration of the combustion and the steps in which it occurs, we can calculate from the mass of the consumed material how much heat, or its equivalent work is thereby generated in an animal body. Unfortunately, the difficulty of the experiments is still very great; but within those limits of accuracy which have been as yet attainable, the experiments show that the heat generated in the animal body corresponds to the amount which would be generated by the chemical processes. The animal body therefore does not differ from the steam-engine, as regards the manner in which it obtains heat and force, but does differ from it in the manner in which the force gained is to be made use of. The body is, besides, more limited than the machine in the choice of its fuel; the latter could be heated with sugar, with starch-flour, and butter, just as well as with coal or wood; the animal body must dissolve its materials artificially, and distribute them through its system; it must, further, perpetually renew the used-up materials of its organs, and as it cannot itself create the matter necessary for this, the matter must come from without. Liebig was the first to point out these various uses of the consumed nutriment. As material for the perpetual renewal of the body, it seems that certain definite albuminous substances which appear in plants, and form the chief mass of the animal body, can alone be used. They form only a

portion of the mass of nutriment taken daily; the remainder, sugar, starch, fat, are really only materials for warming, and are perhaps not to be superseded by coal, simply because the latter does not permit itself to be dissolved.

If, then, the processes in the animal body are not in this respect to be distinguished from inorganic processes, the question arises, whence comes the nutriment which constitutes the source of the body's force? The answer is, from the vegetable kingdom; for only the material of plants, or the flesh of plant-eating animals, can be made use of for food. The animals which live on plants occupy a mean position between carnivorous animals, in which we reckon man, and vegetables, which the former could not make use of immediately as nutriment. In hay and grass the same nutritive substances are present as in meal and flour, but in less quantity. As, however, the digestive organs of man are not in a condition to extract the small quantity of the useful from the great excess of the insoluble, we submit, in the first place, these substances to the powerful digestion of the ox, permit the nourishment to store itself in the animal's body, in order in the end to gain it for ourselves in a more agreeable and useful form. In answer to our question, therefore, we are referred to the vegetable world. Now when what plants take in and what they give out are made the subjects of investigation, we find that the principal part of the former consists in the products of combustion which are generated by the animal. They take the consumed carbon given off in respiration, as carbonic acid, from the air, the consumed hydrogen as water, the nitrogen in its simplest and closest combination as ammonia; and from these materials, with the assistance of small ingredients which they take from the soil, they generate anew the compound combustible substances, albumen, sugar, oil, on which the animal subsists. Here, therefore, is a circuit which appears to be a perpetual store of force. Plants prepare fuel and nutriment, animals consume these, burn them slowly in their lungs, and from the products of combustion the plants again derive their nutriment. The latter is an eternal source of chemical, the former of mechanical forces. Would not the combination of both organic kingdoms produce the perpetual motion? We must not conclude hastily: further inquiry shows, that plants are capable of producing combustible substances only when they are under the influence of the sun. A portion of the sun's rays exhibits a remarkable relation to chemical forces,—it can produce and destroy chemical combinations; and these rays, which for the most part are blue

or violet, are called therefore chemical rays. We make use of their action in the production of photographs. Here compounds of silver are decomposed at the place where the sun's rays strike them. The same rays overpower in the green leaves of plants the strong chemical affinity of the carbon of the carbonic acid for oxygen, give back the latter free to the atmosphere, and accumulate the other, in combination with other bodies, as woody fibre, starch, oil, or resin. These chemically active rays of the sun disappear completely as soon as they encounter the green portions of the plants, and hence it is that in daguerrotype images the green leaves of plants appear uniformly black. Inasmuch as the light coming from them does not contain the chemical rays, it is unable to act upon the silver compounds.

Hence a certain portion of force disappears from the sunlight, while combustible substances are generated and accumulated in plants; and we can assume it as very probable, that the former is the cause of the latter. I must indeed remark, that we are in possession of no experiments from which we might determine whether the *vis viva* of the sun's rays which have disappeared, corresponds to the chemical forces accumulated during the same time; and as long as these experiments are wanting, we cannot regard the stated relation as a certainty. If this view should prove correct, we derive from it the flattering result, that all force, by means of which our bodies live and move, finds its source in the purest sunlight; and hence we are all, in point of nobility, not behind the race of the great monarch of China, who heretofore alone called himself Son of the Sun. But it must also be conceded that our lower fellow-beings, the frog and leech, share the same ethereal origin, as also the whole vegetable world, and even the fuel which comes to us from the ages past, as well as the youngest offspring of the forest with which we heat our stoves and set our machines in motion.

You see, then, that the immense wealth of ever-changing meteorological, climatic, geological, and organic processes of our earth are almost wholly preserved in action by the light and heat-giving rays of the sun; and you see in this a remarkable example, how Proteus-like the effects of a single cause, under altered external conditions, may exhibit itself in nature. Besides these, the earth experiences an action of another kind from its central luminary, as well as from its satellite the moon, which exhibits itself in the remarkable phenomenon of the ebb and flow of the tide.

Each of these bodies excites, by its attraction upon the waters of

the sea, two gigantic waves, which flow in the same direction round the world, as the attracting bodies themselves apparently do. The two waves of the moon, on account of her greater nearness, are about three and a half times as large as those excited by the sun. One of these waves has its crest on the quarter of the earth's surface which is turned towards the moon, the other is at the opposite side. Both these quarters possess the flow of the tide, while the regions which lie between have the ebb. Although in the open sea the height of the tide amounts to only about three feet, and only in certain narrow channels, where the moving water is squeezed together, rises to thirty feet, the might of the phenomena is nevertheless manifest from the calculation of Bessel, according to which a quarter of the earth covered by the sea possesses, during the flow of the tide, about 25,000 cubic miles of water more than during the ebb, and that therefore such a mass of water must, in six and a quarter hours, flow from one quarter of the earth to the other.

The phenomena of the ebb and flow, as already recognized by Mayer, combined with the law of the conservation of force, stand in remarkable connection with the question of the stability of our planetary system. The mechanical theory of the planetary motions discovered by Newton teaches, that if a solid body in absolute *vacuo,* attracted by the sun, move around him in the same manner as the planets, this motion will endure unchanged through all eternity.

Now we have actually not only one, but several such planets, which move around the sun, and by their mutual attraction create little changes and disturbances in each other's paths. Nevertheless Laplace, in his great work, the *Mecanique Celeste,* has proved that in our planetary system all these disturbances increase and diminish periodically, and can never exceed certain limits, so that by this cause the eternal existence of the planetary system is unendangered.

But I have already named two assumptions which must be made: first that the celestial spaces must be absolutely empty; and secondly, that the sun and planets must be solid bodies. The first is at least the case as far as astronomical observations reach, for they have never been able to detect any retardation of the planets, such as would occur if they moved in a resisting medium. But on a body of less mass, the comet of Encke, changes are observed of such a nature: this comet describes ellipses round the sun which are becoming gradually smaller. If this kind of motion, which certainly corresponds to that through a resisting medium, be actually due to the existence of such a medium, a time will

come when the comet will strike the sun; and a similar end threatens all the planets, although after a time, the length of which baffles our imagination to conceive of it. But even should the existence of a resisting medium appear doubtful to us, there is no doubt that the planets are not wholly composed of solid materials which are inseparably bound together. Signs of the existence of an atmosphere are observed on the Sun, on Venus, Mars, Jupiter, and Saturn. Signs of water and ice upon Mars; and our earth has undoubtedly a fluid portion on its surface, and perhaps a still greater portion of fluid within it. The motions of the tides, however, produce friction, all friction destroys *vis viva,* and the loss in this case can only affect the *vis viva* of the planetary system. We come thereby to the unavoidable conclusion, that every tide, although with infinite slowness, still with certainty, diminishes the store of mechanical force of the system; and as a consequence of this, the rotation of the planets in question round their axes must become more slow; they must therefore approach the sun, or their satellites must approach them. What length of time must pass before the length of our day is diminished one second by the action of the tide cannot be calculated, until the height and time of the tide in all portions of the ocean are known. This alteration, however, takes place with extreme slowness, as is known by the consequences which Laplace has deduced from the observations of Hipparchus, according to which, during a period of 2000 years, the duration of the day has not been shortened by the one-three-hundredth part of a second. The final consequence would be, but after millions of years, if in the mean time the ocean did not become frozen, that one side of the earth would be constantly turned towards the sun, and enjoy a perpetual day, whereas the opposite side would be involved in eternal night. Such a position we observe in our moon with regard to the earth, and also in the case of the satellites as regards their planets; it is, perhaps, due to the action of the mighty ebb and flow to which these bodies, in the time of their fiery fluid condition, were subjected.

I would not have brought forward these conclusions, which again plunge us in the most distant future, if they were not unavoidable. Physico-mechanical laws are, as it were, the telescopes of our spiritual eye, which can penetrate into the deepest night of time, past and to come.

Another essential question as regards the future of our planetary system has reference to its future temperature and illumination. As

the internal heat of the earth has but little influence on the temperature of the surface, the heat of the sun is the only thing which essentially affects the question. The quantity of heat falling from the sun during a given time upon a given portion of the earth's surface may be measured, and from this it can be calculated how much heat in a given time is sent out from the entire sun. Such measurements have been made by the French physicist Pouillet, and it has been found that the sun gives out a quantity of heat per hour equal to that which a layer of the densest coal ten feet thick would give out by its combustion; and hence in a year a quantity equal to the combustion of a layer of seventeen miles. If this heat were drawn uniformly from the entire mass of the sun, its temperature would only be diminished thereby one and one-third of a degree centigrade per year, assuming its capacity for heat to be equal to that of water. These results can give us an idea of the magnitude of the emission, in relation to the surface and mass of the sun; but they cannot inform us whether the sun radiates heat as a glowing body, which since its formation has its heat accumulated within it, or whether a new generation of heat by chemical processes takes place at the sun's surface. At all events the law of the conservation of force teaches us that no process analogous to those known at the surface of the earth, can supply for eternity an inexhaustible amount of light and heat to the sun. But the same law also teaches that the store of force at present existing, as heat, or as what may become heat, is sufficient for an immeasurable time. With regard to the store of chemical force in the sun, we can form no conjecture, and the store of heat there existing can only be determined by very uncertain estimations. If, however, we adopt the very probable view, that the remarkably small density of so large a body is caused by its high temperature, and may become greater in time, it may be calculated that if the diameter of the sun were diminished only the ten-thousandth part of its present length, by this act a sufficient quantity of heat would be generated to cover the total emission for 2100 years. Such a small change besides it would be difficult to detect even by the finest astronomical observations.

Indeed, from the commencement of the period during which we possess historic accounts, that is, for a period of about 4000 years, the temperature of the earth has not sensibly diminished. From these old ages we have certainly no thermometric observations, but we have information regarding the distribution of certain cultivated plants, the vine, the olive tree, which are very sensitive to changes of the mean

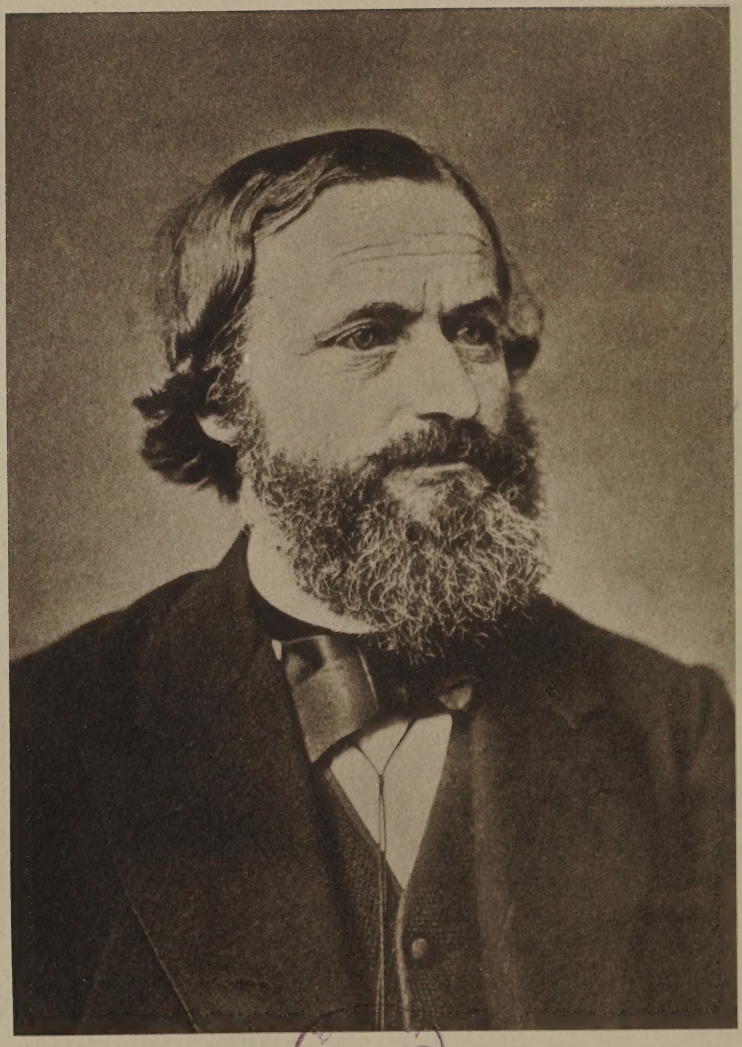
annual temperature, and we find that these plants at the present moment have the same limits of distribution that they had in the times of Abraham and Homer; from which we may infer backwards the constancy of the climate.

In opposition to this it has been urged, that here in Prussia the German knights in former times cultivated the vine, cellared their own wine and drank it, which is no longer possible. From this the conclusion has been drawn, that the heat of our climate has diminished since the time referred to. Against this, however, Dove has cited the reports of ancient chroniclers, according to which, in some peculiarly hot years, the Prussian grape possessed somewhat less than its usual quantity of acid. The fact also speaks not so much for the climate of the country as for the throats of the German drinkers.

But even though the force store of our planetary system is so immensely great, that by the incessant emission which has occurred during the period of human history it has not been sensibly diminished, even though the length of the time which must flow by, before a sensible change in the state of our planetary system occurs, is totally incapable of measurement, still the inexorable laws of mechanics indicate that this store of force, which can only suffer loss and not gain, must be finally exhausted. Shall we terrify ourselves by this thought? Men are in the habit of measuring the greatness and the wisdom of the universe by the duration and the profit which it promises to their own race; but the past history of the earth already shows what an insignificant moment the duration of the existence of our race upon it constitutes. A Nineveh vessel, a Roman sword awakes in us the conception of grey antiquity. What the museums of Europe show us of the remains of Egypt and Assyria we gaze upon with silent astonishment, and despair of being able to carry our thoughts back to a period so remote. Still must the human race have existed for ages, and multiplied itself before the pyramids of Nineveh could have been erected. We estimate the duration of human history at 6000 years; but immeasurable as this time may appear to us, what is it in comparison with the time during which the earth carried successive series of rank plants and mighty animals, and no men; during which in our neighbourhood the amber-tree bloomed, and dropped its costly gum on the earth and in the sea; when in Siberia, Europe and North America groves of tropical palms flourished; where gigantic lizards, and after them elephants, whose mighty remains we still find buried in the earth, found a home? Different geologists, pro-

ceeding from different premises, have sought to estimate the duration of the above creative period, and vary from a million to nine million years. And the time during which the earth generated organic beings is again small when we compare it with the ages during which the world was a ball of fused rocks. For the duration of its cooling from 2000° to 200° centigrade, the experiments of Bishop upon basalt show that about 350 millions of years would be necessary. And with regard to the time during which the first nebulous mass condensed into our planetary system, our most daring conjectures must cease. The history of man, therefore, is but a short ripple in the ocean of time. For a much longer series of years than that during which man has already occupied this world, the existence of the present state of inorganic nature favourable to the duration of man seems to be secured, so that for ourselves and for long generations after us, we have nothing to fear. But the same forces of air and water, and of the volcanic interior, which produced former geological revolutions, and buried one series of living forms after another, act still upon the earth's crust. They more probably will bring about the last day of the human race than those distant cosmical alterations of which we have spoken, and perhaps force us to make way for new and more complete living forms, as the lizards and the mammoth have given place to us and our fellow-creatures which now exist.

Thus the thread which was spun in darkness by those who sought a perpetual motion has conducted us to a universal law of nature, which radiates light into the distant nights of the beginning and of the end of the history of the universe. To our own race it permits a long but not an endless existence; it threatens it with a day of judgment, the dawn of which is still happily obscured. As each of us singly must endure the thought of his death, the race must endure the same. But above the forms of life gone by, the human race has higher moral problems before it, the bearer of which it is, and in the completion of which it fulfils its destiny.



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KIRCHHOFF AND BUNSEN

GUSTAV ROBERT KIRCHHOFF was born at Koenigsberg, Prussia, March 12, 1824. He took his degree there in 1846. In 1850 he was made Professor of Physics at Breslau. Together with Robert W. Bunsen he invented the method of spectrum analysis, which we give below. The importance of this method and of the many discoveries of new elements and in stellar astronomy made by its aid gives him rank as one of the greatest scientists of the century. He died Oct. 17, 1887.

ROBERT WILLIAM BUNSEN was born at Göttingen, March 31, 1811. He studied in his native town, where his father was professor, and became a professor at Breslau, then at Heidelberg (1852). He invented the Bunsen burner, and was a partner with Kirchhoff in their invention of spectrum analysis and subsequent discoveries of new elements. He died Aug. 15, 1899.

CHEMICAL ANALYSIS BY MEANS OF THE SPECTROSCOPE

Many substances are well known to have the power when burned in a flame of causing certain bright lines to appear in the spectrum. It is possible to base on these lines a method of qualitative analysis that immensely widens the field of chemical analysis and solves questions hitherto unanswered. We shall here limit ourselves merely to the application of this method to the detection of the metals in the alkalies and alkali earth and to a series of illustrations as to the value of their methods.

Such lines appear plainer the higher the temperature and the less the natural light of the flame in which the substance is heated. The Bunsen burner described by one of us has a flame of very high temperature, but very small luminosity, and is therefore specially suited to experiments on the substances that produce bright lines in the spectrum.

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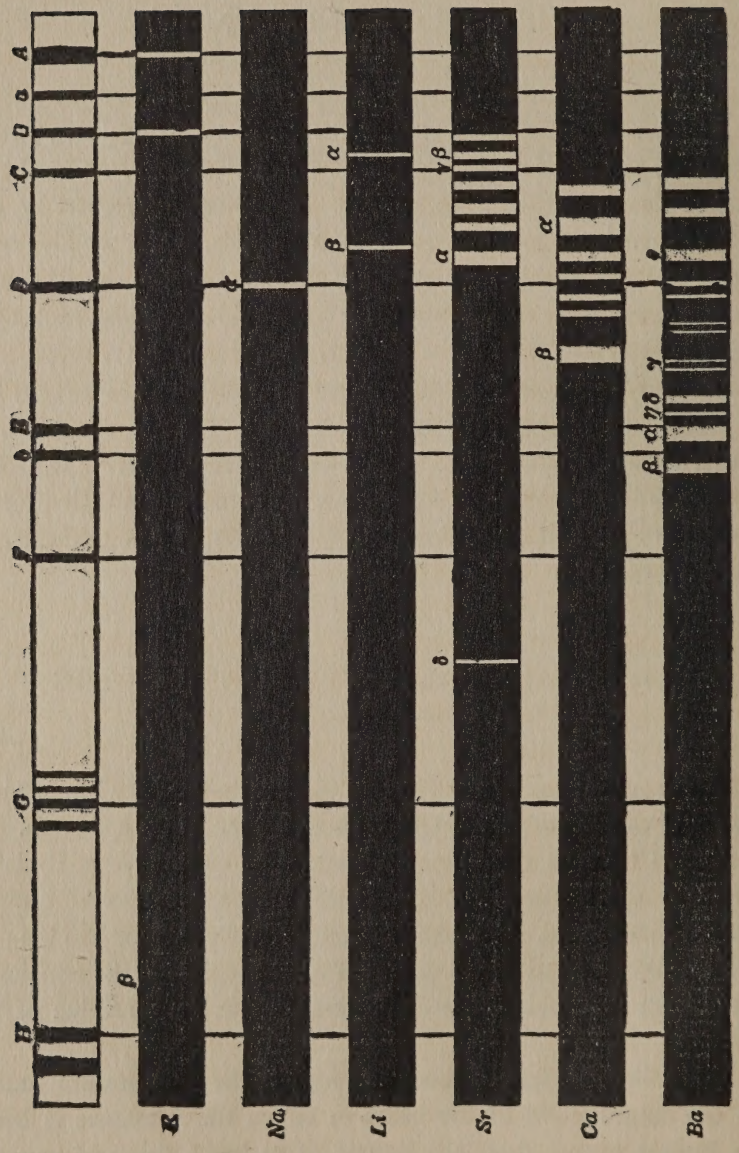

FIGURE 1.

In figure one the spectra are illustrated which the flames mentioned produced when the salts, as pure as possible, of potassium, sodium, lithium, strontium, calcium, and barium, are heated to a vapor in it. The solar spectrum is also reproduced in order to render a comparison easy. * * *

Figure two represents the apparatus that we have usually used in observing the spectrum. The box A, resting on three feet, has the form of a trapezium and is blackened on the inside. The two inclined sides of the box make an angle with each other of about fifty-eight degrees, each carrying a small telescope, B or C. The eye-glass of the first is removed and in its place is put a plate, in which there is made a slit formed by two brass bands at the focus. The lamp D is so placed in front of the slit that the mantle of the light would be cut by the axis of the telescope B. Just under the point where the axis would cut the mantle the end of a very fine platinum wire passes into it. This wire is bent into a hook and is carried by the holder E. On this hook is melted a drop of the chloride previously dried on it. Between the object glasses of the two telescopes B and C there is placed a hollow prism F, filled with carbon disulphide. This prism rests upon a brass plate that can be moved round on a vertical axis. This axis has at its lower end the mirror G, and above this the arm H, which is used as a handle to rotate the mirror and the prism. Another telescope is adjusted in front of the mirror. This gives an image of a horizontal scale located a short distance away. By turning the prism we can make the entire spectrum of the flame pass before the vertical thread of the telescope C and can make every part of the spectrum correspond with this thread. A particular point of the spectrum corresponds to every reading on the scale. When the spectrum is very weak the cross hair of the telescope C may be illuminated by a lens throwing part of the rays from a lamp through a small opening made laterally in the eye-glass of the telescope C.

The spectra in figure one, produced by the pure chloride already mentioned, have been compared by us with those obtained when we have introduced the bromides, iodides, hydrated oxides, sulphates, and carbonates of the various metals into the flame of sulphur, the flame of carbon disulphide, the flame of aqueous alcohol, the non-luminous flame of coal gas, the flame of carbonic oxide, the flame of hydrogen and the oxyhydrogen flame.

From these inclusive and detailed investigations, the particulars of which we may omit, it becomes evident that the difference in the com-

pound in which the metals were used, the great variety of the chemical reactions in the various flames, and the immense differences of temperature in such flames *have absolutely no effect on the position of the spectral lines characteristic of the different metals.* * * * The same metal compound seems to give in any flame a more intense spectrum as the temperature is higher. The compounds of these metals that have the greatest volatility give the most intense flame.

For another proof that each of these metals always gives the same bright lines in its spectrum we have compared its spectra with the spectra of an electric spark passing between electrodes made of these metals.

Bits of potassium, sodium, lithium, strontium, and calcium were fastened on a fine platinum wire and so melted, two at a time, within glass tubes, the wires piercing the sides of the tubes so that they were distant from one to two millimeters from each other. Each tube was adjusted before the slit of the spectroscope. We made electric sparks pass between these metal pieces by using a Ruhmkorff induction coil and compared the spectrum thus given with the spectrum of the chloride of the same metal, when brought into the gas flame, placed behind the glass tube. When the Ruhmkorff apparatus was alternately thrown in and out of action one was easily convinced without need of measuring accurately that the bright lines of the spectrum from the flame remained present without being displaced in the brilliant spectrum of the spark. In addition to these, however, in the spark spectrum there appeared other bright lines, some of which must be laid to the presence of foreign metals in the electrodes, others to nitrogen which remained in the tubes after the oxygen had combined with the electrode.

It is therefore unquestionable that the bright lines described in the spectra may be regarded as absolute proof of the presence of the metal in consideration. They can serve as tests by means of which this material may be more certainly and readily and minutely detected than by any other analytical method.

The spectra in a figure are produced when the slit is wide enough so that only the most noticeable of the dark lines of the solar spectrum appear. The observing telescope magnifying only about fourfold and the light not being intense. These conditions appear the most suitable for carrying out a required chemical analysis by spectral experiments. The looks of the spectrum may vary considerably under other circumstances. If the purity of the spectrum is increased (by greater mag-

nification), a number of the lines that seemed single are resolved into several, the sodium line, for instance, into two; if the intensity of the light is increased, in many of the spectra shown new lines make their appearance and the old ones change their relative brightness. In general darker lines increase in brightness with the greater intensity of the light more rapidly than a brighter one, but not enough to surpass it in brightness. The two lithium lines constitute a good example of this fact. We have noted only one exception to the rule. The line Ba e, which with the light not intense is scarcely visible, while Ba g shows very distinctly, becomes much brighter than the latter when the light is more intense. This fact seems to be important and we shall make a further study of it.

We shall now enter more minutely into the characteristics of the various spectra, a knowledge of which is important from a practical point of view, and illustrate the advantage offered by a chemical analytic method founded upon the spectrum.

Sodium

Of all the spectral reaction the most sensitive is that of sodium. The yellow line Na a, the only one appearing in the sodium spectrum, coincides in position with Fraunhofer's line D in the solar spectrum and is marked by its particularly sharp boundary and its unusual brilliancy. If the temperature of the flame is very high and the amount used large, indications of a continuous spectrum appear adjacent to the line. Lines of other elements, in themselves not strong, coming near it, appear still weaker, and are therefore often visible only after the sodium reaction begins to fade away. The reaction is strongest in the oxygen, chlorine, iodine and bromine compounds in sulphuric and carbonic acids, but it is also evident in the silicates, borates, phosphates and other non-volatile salts.

Swan has already noted the minute quantity of common salt sufficient to produce a clear sodium line.

The experiment that follows emphasizes the fact that no reaction in chemistry compares even remotely in sensitiveness with this analytic spectral detection of sodium. In one corner of the experiment room, which contained, say sixty cubic meters of air, we detonized, as far away from our apparatus as possible, three milligrams of chlorate of sodium with milk sugar while the non-luminous flame was under observation in front of the slit. After some moments the flame gradually turned pale yellow and gave a strong sodium line, which again vanished

in about ten minutes. Now it is easy to estimate, noting the weight of the detonized salt and the amount of air in a room, that in a unit weight of air not one twenty-millionth part of sodium smoke could have been suspended. As the reaction can easily be seen the first second, and as in this time, in accordance with the flow and composition of the gases in the flame, only about fifty ccm. or .0647 grams of air containing less than 1-20,000,000 of sodium salt burn in the flame, we conclude that the eye can detect less than 1-3,000,000 of a milligram of sodium salt as the greatest distinctness. With so sensitive a reaction it is evident that there would rarely be a sodium reaction not detectable in glowing atmospheric air. The earth over more than two-thirds of its surface is covered with a solution of chloride of sodium. As the waves break in the foam, this is continually changed into spray and the particles of sea water which thus enter the atmosphere, evaporate and leave behind them traces of salt varying in size, but rarely absent from the air, perhaps being of use in supplying small organisms with salt, the same as the ground supplies it to the larger plants and animals. The presence of salt in the air, easily detected by spectrum analysis, is of interest from still another point of view. If, as we can hardly yet doubt, there are catalytic influences that aid the spread of disease, it is possible that an antiseptic substance, such as salt, may not be, though even in the smallest quantities, without noticeable influence on such reactions in the air. Now it would be easy to discover from continued daily observation of the spectrum whether the variation in strength of the spectral line Na a, representing the sodium reaction in the air, is in any way concomitant with the rise and spread of endemic diseases. The wonderfully sensitive reaction of sodium may also explain why all bodies when heated in the flame show the sodium if left exposed to the air, and why one can eliminate the last trace of the sodium line Na a in only a few compounds, and after crystallizing them ten times or more from water that has come in contact with platinum vessels only. A platinum hair wire that had been freed by heat from every trace of sodium gives this reaction very vividly if it is exposed some hours in the air. Dust settling in the room from the air shows it as plainly, so that, for example, the slapping of a dusty book is enough to give brilliant flashes of the Na a line at a distance of several paces.

Lithium

The incandescent vapors of the compound of lithium produce two well defined lines, one a pale yellow Li b, the other a bright red line

Li a. This reaction is more certain and delicate than any hitherto known in analytical chemistry. It is not as delicate as the sodium reaction, perhaps because the eye is more sensitive for yellow than for red. * * * By means of experiments the unlooked-for result is reached that lithium is one of the substances most widely distributed throughout nature. * * * In the production of compounds of lithium on a large commercial scale spectrum analysis is an invaluable method of selecting the raw material used and deciding on the most efficient process of manufacture. For example, it is necessary to evaporate only a drop of the various mother-liquors in the flame and note the result through the telescope in order to discover at once that a rich and heretofore unnoticed supply of lithium exists in many saline residues. And in the course of preparation we can trace any waste of lithium in the by-products by means of spectrum analysis, and hence at once seek more efficient processes of manufacture than those being used.

Potassium

The unstable compounds of potassimu produce a wide continuous spectrum in the flame, showing only two characteristic lines: the first, Ka, in the edge of the red and bordering on the ultra red rays, coincides exactly with the dark line A of the solar spectrum; the second, Kb, far in the violet at the other end of the spectrum, also is identical in position with a Fraunhofer line. There is also a very weak line corresponding to Fraunhofer's line B, but it is only visible with an intense flame, and so less characteristic. The violet line is not strong, but is about as well adapted for discovering the presence of potassium as the red line. The position of both lines, near the last visible to the eye, makes this reaction less sensitive than those already mentioned. * * *

Strontium

The spectra given by the alkali earths are not as simple as those from the alkalies. Strontium is peculiar for the absence of green bands. Of its spectrum eight lines are remarkable, six of them red, one orange, and one blue. The orange line Sr a appearing close to the sodium line near the red; the two red lines Sr b, Sr g, and finally the blue line Sr d are the most important in position and brightness. * * * We can according to experiment estimate that 6-100,000 of a milligram of strontium is discoverable to the eye. * * * The reaction of potassium and sodium is not interfered with by the presence of strontium. The lithium reaction is distinctly visible along with these three, if the amount of lithium be not too small in comparison with that of stron-

tium. In this case the lithium line shows itself as a narrow red line, very intense and highly defined, against the weaker red background of the broad strontium line Sr b.

Calcium

The spectrum of calcium can be distinguished at first glance from the four others already described by the perfectly characteristic marked green line Ca b. A second equally remarkable distinction is the very bright orange line Ca a, situated considerably nearer the red end of the spectrum than the sodium line Na a, or the orange line of strontium Sr a. By burning a mixture of calcium chloride, chlorate of potassium, and milk sugar we produced a smoke the reaction from which has about the same sensitiveness as that from the chloride of strontium fumed under the same conditions. From an experiment made in this way it resulted that 6-100,000 milligrams could be easily and definitely detected. Only the calcium compounds that volatilize in the flame give this reaction, and the more volatile the compound the plainer the reaction. Chloride of calcium, iodide of calcium, and bromide of calcium are the best. Sulphate of calcium produces a spectrum only when it has become basic, then a brilliant and lasting one. In the same way the reaction of the carbonate becomes visible after the acid is driven away.

* * *

Barium

Barium has the most complicated spectrum of the alkalies and the alkaline earths. It is at once distinguishable from those already considered by the green lines Ba a and Ba b. These surpass all others in brilliancy, and appear first and fade last in weak reactions. Ba g is not so distinct, but is nevertheless to be noted as a characteristic line. The relatively wide extension of the spectrum explains why the barium reaction is considerably less sensitive than those hitherto examined. Three-hundredths of a gram of chlorate of barium, burned in our room along with milk sugar, gave in air, mixed by moving an open umbrella, the line Ba a for a long time very distinctly. We may therefore conclude by a calculation as in the case of sodium that the reaction will show 1-1,000 of a milligram with absolute distinctness. * * *

For those that are familiar through repeated observation with the various spectra, no accurate measurement of the separate lines is necessary, as their color, position, peculiar degree of definiteness and shade, and difference in brilliancy are differentia sufficient for even the inexperienced to clearly recognize them. These individualities may be com-

pared with the distinguishing marks used as a reaction test borne by the different precipitates in outward appearance. As the precipitate shows gelatinous, pulverized, flocculent, granular, or crystalline, so the spectral lines are characteristic in the definiteness of their edges, in their regular or irregular shading away on one or both sides, and in their breadth or narrowness, as the case may be. As also we use only those precipitates for analysis that are producible from the greatest possible dilution, so in spectrum analysis we use only those lines requiring only the smallest amount of substance and only a moderate temperature to produce them. In such ways the two methods are quite comparable. But in the color phenomena of the reaction, spectrum analysis has a quality that gives it infinite advantage over any other method of analysis. The precipitates that are used in chemical analysis are most of them white, and but few colored. Even of the colored the tint is not very constant and differs considerably, in accordance with the greater or less condensation of the precipitate. The smallest mixture of some foreign matter is often enough to change entirely a characteristic color. Hence small differences in the color of precipitate cannot be used as a sure chemical test. But in spectrum analysis, on the other hand, the colored bands remain unaffected by such foreign influences or the presence of other bodies. The positions in which they lie in the spectrum is a definite characteristic that is as unchanging and fundamental as the atomic weight of the substance, and gives us power to detect the substance with almost astronomical exactness. What, moreover, is peculiarly important in the case of spectrum analysis, is that its power extends almost infinitely beyond the limit to which the chemical analysis of matter has hitherto reached. It promises invaluable results on the distribution and ordering of geological substances in their original formation. The few experiments included in the present treatise already point to the unlooked-for result that not only potassium and sodium, but also lithium and strontium must be numbered among the substances most widely scattered throughout the earth, though in only minute quantities.

Spectrum analysis will have fully as important a share in the discovery of unknown elements. For if there are substances scattered in such minute quantities throughout nature that the methods of analysis hitherto used in observation have failed to detect them, we may expect to discover and differentiate many of them that would be hidden to the usual method of chemical analysis, merely by the investigation of the

spectra inflamed. That such elements, previously unknown, do really exist, we have already been able to show. We also believe that we shall yet be able to declare absolutely, on the strength of unquestionable conclusions from spectral analysis, that besides potassium, sodium and lithium there remains a fourth metal of the alkali group. This will give quite as characteristic a spectrum as lithium; it shows with our spectrum method only two lines, a weak blue one nearly opposite the strontium line Sr d, and a second blue line lying a little farther toward the violet, and almost as bright and clearly marked as the lithium line.

Spectrum analysis gives us, as we believe we have already shown, a method of marvelous simplicity for discovering the slightest traces of many elements throughout the earth on the one hand, and on the other, it throws open to chemical investigation a field hitherto entirely inaccessible, extending far beyond the limit of the earth and the solar system itself. Since it is enough for this method of analysis merely to see the gas in an incandescent state to analyze it, it is evident that this same method would apply to the atmosphere of the sun and the brighter fixed stars.

The Reversal of the Spectrum

Right here there must be introduced a modification in regard to the light the nuclei of these heavenly bodies radiate. In a treatise "On the Relation Between the Emission and Absorption of Heat and Light" one of us has shown theoretically that the bright lines of an incandescent gas are transformed into dark ones when a sufficiently bright source of light giving a continuous spectrum is placed behind it, that is, the spectrum of the gas is reversed. From this it results that the sun spectrum with its dark lines is nothing else than the reversal of the spectrum which the (outer) atmosphere of the sun would show. Hence, to analyze chemically the sun's atmosphere (not the sun itself) requires only the investigation of the substances that produce in the flame bright lines corresponding with the dark ones of the sun's spectrum. In the memoir mentioned are given the following examples as proofs by experiment of the theoretical law referred to:

The bright red line in the spectrum from a bead of a chloride of lithium in a flame is changed into a black line when we allow full sunlight to pass through the flame.

Substituting a bead of sodium chloride for the lithium, the dark double line D, corresponding to the bright sodium line, shows itself in the sun's spectrum with remarkable clearness.

The dark double line D is given in the spectrum of the Drummond light if its rays are passed through the flames of aqueous alcohol, into which chloride of sodium has been introduced.

A still further confirmation of this remarkable theoretical law may not be uninteresting. This may be reached by the experiment described below:

We heated a thick platinum wire in a flame until it was incandescent and by means of an electric current nearly brought to the melting point the wire (like other solids at white heat) gave a bright spectrum with no traces either of specially brilliant or dark lines. If a flame of alcohol much diluted with water, containing common salt in solution, was introduced between the platinum wire and the slit of the apparatus the dark line D appeared very distinctly.

We can obtain the dark line D in the spectrum of a platinum wire incandescent in a flame by merely holding before it a test tube, into which some sodium amalgam has been put, and heated to the boiling point. This experiment is important because it shows that far below the incandescent point of sodium vapor it absorbs exactly the same parts of the spectrum as when at the highest temperature we can produce, or at that which the sun's atmosphere is kept.

We have been able to change bright lines into dark in the spectra of potassium, strontium, calcium, and barium by using sunlight and mixtures of the chlorates of these metals with milk sugar. The mixture was put into a small iron trough before the slit of the apparatus, the full sunlight was let to pass along the trough of the slit and the mixture set on fire at one side by an incandescent wire. The telescope was set with the intersection of its cross hairs, which were placed at an acute angle with each other, on the bright line in the flame spectrum, the reversal of which was to be looked for. The observer put all his attention on this point in order to be sure whether at the instant of the flash a dark line appeared passing through the intersection of the cross hairs. It was not hard by this method, the mixture to be burnt being properly proportioned, to note the reversal of the lines Ba a and Ba b and the line Kb. The last of these corresponded with one of the most distinct lines of the solar spectrum; although it is not noted by Fraunhofer, this line showed itself most distinctly at the moment of ignition of the potash salt.

To observe the reversal of the bright lines of the strontium spectrum by this method, the chlorate of strontium must be very carefully dried, for a very slight moisture weakens the sun's rays and produces

the positive spectrum of strontium, because the flame becomes filled with salt particles that have been scattered about by the combustion.

We have limited ourselves in this record to investigate in the spectra of the alkali metals and earths, and these only as far as necessary for analyzing substances here on earth. We reserve for ourselves the further extension of such investigations suitable to analyzing terrestrial substances, and the analysis of the atmospheres of the stars.

Heidelberg, April, 1860.

EDUCATION

FRIEDRICH FROEBEL

Friedrich Wilhelm August Froebel was born Apr. 21, 1782, at Oberweissbach, a village of the Thuringian Forest, where his father was a pastor of seven villages. His mother died when he was but an infant and he was sadly neglected. His father married again and the neglect was followed by stepmotherly supervision; but a maternal uncle took pity on him and gave him a home at Stadt-Ilm, where he went to the village school for some time. He was always looking for hidden connections and an underlying unity in all things, but nothing of this kind was to be found in the schools, and busy as was Froebel's mind, it would not work for his masters, so he was passed for a dunce. Therefore his brother was thought more worthy of a university education and at fifteen Friedrich was apprenticed to a forester. Left to himself he began to study nature and without instruction he gained a wonderful knowledge of the uniformity and essential unity of nature's laws. When he left the Forest, at the age of seventeen, he possessed the main ideas that influenced him all his life. He longed to study the natural sciences and managed to persuade his father to send him to Jena, where he spent a year going from one lecture-room to another seeking some interrelation between the sciences, which he cared more for than any particular science. Having little money and no management, he ended by being sent to prison nine weeks for a debt of thirty shillings.

His true vocation was first recognized, while he was at Frankfort-on-the-Main, by a friend, who persuaded him to take a place as instructor in a model school, where he had wonderful success. Two years later he undertook the education of three brothers, but was dissatisfied with his own results and got the parents to let him take the boys to Pestalozzi's school, where he studied with them for two years. This gave him a pretty thorough knowledge of Pestalozzi's theory and helped to prepare him to carry on the work which Pestalozzi had started. He wanted to continue his studies in the natural sciences and in 1811 attended Göttingen and from here went to Berlin. But when the War of Liberation broke out he joined Lützow's corps and went through the campaign of 1813. In 1814 he returned to Berlin and became curator of the Museum of Mineralogy.

In 1816 he opened a school at Grieshiem and the following year Middendorff, whom he had met in the field, joined him and the school was moved to Keilhau. They did not confine themselves to Keilhau, but organized schools in many parts of Germany and Switzerland.

In 1826 Froebel published his first work, *Die Menschenerziehung* (The Education of Man). This deals chiefly with the child up to the age of seven. In 1836 he started the first kindergarten at Blankenburg and in 1837 the Duke of Meiningen gave him the use of his mansion to establish a normal school, where teachers were instructed. The rest of his life was spent in organizing kindergartens and training teachers to carry on his system of teaching. He stands particularly, first, for the early education of the child in the kindergarten, and, second, for so making use of the ordinary play instincts of children as to lead them insensibly to self-education by what seems to them merely play. He died June 18, 1852.

THE KINDERGARTEN

LETTER TO MISS HOWE, AT LEITHEIM, NEAR DONAUWORTH

Keilhau, 18*th April*, 1847.

First, let me offer my warmest thanks for your cordial sympathy with my efforts in education. I hope that your enthusiasm for the work may hereafter produce blessed results for the budding human race, somewhere or other in the world.

Your kindly meant proposal, which you suggest to me as the best

way of attaining my life-aim—the establishment of my system of education (now proved by years of trial to be true, for it has been fully tested by results), namely education by development, in one of the great centres of the world, such as London or Paris, or in the United States of America, so that it may be thoroughly examined and applied on a large scale—has been put before me, many times already, by influential men. But there is one insurmountable objection to it as far as I am concerned —my want of a complete mastery of foreign tongues.

The educational scheme in itself, and the plan for carrying it into practice, are quite complete in every particular, and clearly and precisely arranged in my mind, and, indeed, they have already been many times applied in actual practice, whenever, and so far as opportunity has allowed. A small part of the system has been printed and published, but this consists of detached fragments only.

Every sharply defined grade of human culture, such as that under which we now live, demands a system of education which shall embrace the whole being of man, his mental and natural sides, and all his varied affinities and relations, and shall therefore, as true to both man and child, educate the latter progressively and by development, in such a way as to produce and constantly maintain a sense of unity and completeness running through the whole of its life.

Such a scheme of education is mine, and therefore it sets itself (and always, from the first plan, did set itself) the definite task of founding anew the practical methods of actual teaching, so as to bring them into satisfactory relation with the needs of our life of to-day; that is, from each grade of culture to produce the next higher grade, by natural and logically consecutive development, in the same way that we see the fruit develop from the blossom and ripen into seed. This will occur with the following plan.

PLAN

I. Decision, zeal, and perseverance must be brought to bear in working upon my plan; so that

(*a*) More careful observation of the child, his relationships and his line of development, may be become general amongst us; and thereby

(*b*) A better grounded insight be obtained into the child's being, mental and physical, and the general collective conditions of his life.

(*c*) The laws of educational progress may be more and more clearly deduced, for the child and the man, through the observation of

those engaged in teaching; the truth of these laws proved, and the child actually trained in accordance with them.

(*d*) Deeper insight will be gained into the meaning and importance of the child's actions and outward manifestations; and also into

(*e*) The way of dealing with children which has been evolved naturally by the mother, led by her pure maternal instinct; treating both the mother's action and the child's as representative, regarding them firstly in relation to the child's destiny as a man, and secondly, to the means and methods of attaining that destiny. Thus, careful observation would be directed towards the combined mother-and-child-life, for it is here in a peculiar and especial sense that we are to seek the expression of the natural laws of development and their application, which laws, when deduced, are those whereby alone our problem can be fully and completely solved: that is, the problem of the general all-embracing progressive development and education of the child. Therefore, finally,

(*f*) It is the aim of my plan, by working so as to gain all the objects above enumerated, to bring about a more general use of progressive development in the culture and education of children; or rather, indeed, that this view of education may establish itself as the one which alone truly expresses and satisfies the needs of each individual as well as of each community, large or small.

According to the above it comes within the scope of my plan,

II. To lay down a scheme of culture covering the entire bodily and mental circumstances and conditions affecting the child, which must express, truly and harmoniously, the line of development and education to be followed.

As early as the year 1826 I took much pains to lay the foundations for such an undertaking by my book, called "The Education of Man" (*Menschen-Erziehung*).

But as the work of education really begins with the birth of the child, and must at first be pursued in the family, and especially by the mother, I started a journal (1838-40), called The Sunday Journal (*Sonntagsblatt*), to direct attention to this aspect of the matter, and in particular to begin and carry out an educational course planned in reference to this doctrine. The course eventually resolved itself into a quite unique form of practically educational book for the very first training of the child, that is, for mere babyhood; influencing and training the child's body, his limbs and his senses, as well as his soul, his mind and his whole inner nature—the book for mothers and families known as "Songs for Mothers and Nursery Songs" (*Mutter und Kose-Lieder*).

III. But such a course of training and occupations for children, answering to the laws of development and the laws of life, demanded a thoroughly expressive medium in the shape of materials for these occupations and games for the child: therefore, to meet this want I arranged a series of play materials under the title of "A complete series of gifts for play."

IV. The present condition of our social life, in all its varied grades, first demands, however, if we are to attain an earlier and better training for children, a much more complete training for their mothers and outside helpers, in the shape of children's nurses, nursery governesses and teachers. Whatever is itself perfect and vigorous will produce what is perfect and vigorous in its turn. But such a result can only be attained by associated work; just as in the education of children we absolutely need the association together of numbers of children alternately with the quiet of the home training. I therefore recognized as early as 1840, that for the needs of our present grade of social development two distinct species of schools or training establishments were absolutely necessary.

(*A*) We need a training establishment for those who are to assist in the home education of families in the capacities of children's nurses, nursery governesses and teachers. But, since children to a quite peculiar degree educate one another, mutually, if meeting together for associated play, under proper guidance and suggestive influence, we equally need

(*B*) Establishments for training quite young children, in their first stage of educational development, where their training and instruction shall be based upon their own free action or spontaneity, acting under proper rules; these rules not being arbitrarily decreed, but such as must arise by logical necessity from the child's mental and bodily nature, regarding him as a member of the great human family; such rules as are, in fact, discovered by the actual observation of children when associated together in companies. These establishments bear the name of Kindergartens, or "Gardens of Children," a name expressing both their aims and their methods of working.

(*A*) In the first-named species of training establishments, those for the training of teachers to assist educationally at home, in the family, the teachers for the second species of establishments, the Kindergartens, would also be trained. These last named teachers might be called "Child-gardeners" (*Kindergaertnerinnen*), according to the work they

will have to do as Kindergarten teachers. I made great efforts at the time of the Guttenberg Festival, in 1840 (400th anniversary of the invention of printing), to awake a general public interest in this matter, and to found a perfectly arranged Kindergarten Training College by public subscription. I have, however, hitherto failed to obtain the amount of public support necessary to carry out the establishment on the scale needed for completeness; and I have, therefore, been compelled to do the best I could by private enterprise alone, and without funds, working myself and at my own risk. Consequently, I have held a training course annually, the length of which I was forced to confine to six months, and the object of which was to educate young girls in Kindergarten methods so far as to enable them to take the entire educational charge of children up to school age. They are to occupy the children in such wise that ennobling and educationally progressive impressions shall remain imprinted on their minds, and they are to develop the children's ideas so as to tend towards the culture of their whole nature, and to the expression of every need of their life. Wherefore, I always associate actual work in a Kindergarten with my Training Course to give my students opportunity for practice in their future duties.

The practical working of my training course is as follows:—

(*a*) The working day for students generally begins at 7 o'clock in the morning; and they attend from 7 to 8 the various classes of the usual morning's religious instruction given in the elder boys' school, so that they may be guided to the right method of imparting religious instruction to children, and may be trained to the care and observation of the earliest germs of the religious instinct in man.

(*b*) From 8 to 9, breakfast and recreation.

(*c*) From 9 to 10, explanation and observation of the development of child-life, of the nature of the child thereby unfolded, and of the laws and corresponding needs of the culture and education of children; as well as demonstration that these laws are at the same time essentially those of every satisfactory scheme of education.

(*d*) The rest of the various weekdays, up till 7 o'clock in the evening, except for two breaks (for dinner and tea) is devoted by the students to the study and practice of practical efficiency in my methods for children's education. These comprise, amongst others,—

1. The acquisition of little games, arranged to exercise the limbs and senses of the child, using also the family nursery-book before mentioned.

2. The acquisition and practice of other games for children, arranged to serve special ends, and particularly suited to varied grades of development, these games being played with the materials referred to in Section III. These games collectively form a series, linking themselves one to the other into a harmonious whole, full of life and vigour, and bringing out, amongst them, every phase and side of the child's life.

3. Further acquisition of many and varied little occupations or handicrafts in various materials, bearing the same causal connection with the games before referred to as a fruit bears to its flower, and expressing all possible grades of the child's development with precision. This department of the training course is in the highest degree important for the student; indeed, it is quite as important as the preceding, because the child exercising its own spontaneous activity through these handicrafts, and becoming acquainted with common facts of life, is carried forward in the path of education as a firmly compact, vigorous, complete unity.

4. Practice in combined games for many children, and particularly action-games, which will, from the first, train the child (by his very nature eager for companionship) in the habit of association with comrades, that is, in good fellowship and all that this implies. A logically necessary part of my system, deeply rooted in the innermost principles of the whole, is the fundamental rule that frequent changes must be made in the children's games and occupations, and for these changes (which must be by no means left to chance to determine, but must be well thought out) the students of the Kindergarten system must be thoroughly prepared. For example: to games for individual children succeed games for the whole Kindergarten together; to games which involve sitting or standing still succeed games which involve action. The child in these associated games alternately appears first as taking some individual or separate part, and then as merely one of several closely knit and equally important members of a greater whole, so that he becomes familiar with both the strongly opposed elements of his life; namely, the individual determining and directing side, and the general ordered and subordinated side. And all this must, of course, invariably be suited to the nature of the child; to the course of development which is being pursued; to his physical capacities, etc., and must express the outward circumstances of his life, their condition and laws. The aim is to train the child harmoniously on all sides of his being, and to bring him to comprehend the intelligent, the well-mannered, the moral, and finally,

the religious elements in life. One of the most powerful agencies for furthering this aim is singing, which works by words and by musical tones, by meaning as well as by melody.

5. Therefore, further, the students have to be specially trained in children's songs, little songs to elevate the heart and open the mind; partly used also to accompany the many various games played by the children, in which case they are carefully devised to lay bare the inner meaning of the game, and also to serve as an outlet for the spontaneous and diligent activity of the children; and, further, these songs always set forth the harmony, the inner concord, and the love which pervade the universe, and which make known to us the Creator as our true and loving Father.

It is acknowledged that children entrusted to the care of teachers of this kind quickly gain pleasure in singing, and some amount of executive power; and even the love for real music itself awakes within them, and is cherished. To the culture of the heart, the soul, and the intellect through the ear, by the means of song, corresponds precisely their culture through the eye by the means of beautiful forms, figures, and colours. And to singing in the one case correspond drawing and colouring in the other.

6. The rudiments of drawing are therefore invariably and quite completely developed amongst the students through the study and constant practice of the various games, especially those involving construction, partly by the culture of the eye in judging of size and form, and partly by the use of the hand in the constructive work.

7. The necessary naming of objects, and the description of their properties and relationships in drawing, bring us quite naturally to the consideration of the beginnings of speech. And in the simplest way, by the necessity of expressing words and tones in some visible manner—that is, by definite signs which may be seen, we reach Writing and Reading; the passage being quite spontaneous, and satisfying the inner as well as the outer nature of the child, his natural instinct for active work driving him towards presentation of all kinds.

8. The continually growing crowds of all kinds of objects, and their comparison together, necessitate the consideration of the first rudiments of Number, and its relationships.

9. And since Order, Measure, Rhythm, Form, Size, Number, Ratio, etc., are on all sides visible and audible, nay, even they may often

also be touched and tasted, it seems as if everything were pointing to Mathematics as the one true way, and the one true science of order and knowledge, as, so to speak, the central point of all true perception of things; and that is why she has to show herself to the child, but in purest child-like guise, and like the earnest way-worn philosopher, becoming herself a child for the child's sake. And the same paths by which the child is led, through the quiet observation of fixed forms and objects, are also opened to him even more readily by comparison of the living and moving forms and objects of animated nature. Wherefore, in no less a degree than to the foregoing,—

10. The students must devote themselves to the thoughtful observation of Nature, as a book and a scripture of God, and to the introduction of the little ones entrusted to their care to the same study, through which they may be led on to perceive and acknowledge the Father who loves them all, the Creator of this world of beauty. Through all nature, especially the vegetable world, the kingdom of bud, and flower and fruit, fly the angels, silent, bearing holy messages to us from Him. Therefore, also,—

11. The students must acquire some knowledge of the cultivation of plants, and flowers, and gardens. Gardens for children should receive their special attention, as these are an important means of education and development, and therefore form part of the Kindergarten system.

12. The self-consciousness, the feelings and the thoughts awakened by all these means of stimulus must be linked to the Word, must be made manifest in little songs or proverbs. This is especially the case as regards the dim perceptions of a wise Creator of Nature, and a Father who thinks for us and loves us.

(*B*) The students get their practice with classes of children; twice a week with our own children, and a few others from the village, and twice a week also with a larger class in the next village.

Just one word now on the Kindergarten itself, in which all the above scheme is brought into practical application. The Kindergarten is to undertake the entire care and training of the child from the earliest possible age to school age, that is, till he is six or seven years old. As to age much depends upon the grade of development of the individual child, and much upon the culture of the teacher.

I can but hope that the *resume* of my method for the early care of

children may meet with your approval. For further details I will refer you to my published works.

Receive the assurance of my special esteem, and believe me,

Yours faithfully,

FRIEDRICH FROEBEL.

HORACE MANN

HORACE MANN was born in Franklin, Mass., May 4, 1796. His father was a poor farmer and his health was injured by hard labor during his youth. His father died when he was a lad of thirteen, and up to the age of fifteen he had never attended school for more than eight or ten weeks in a year. He worked at home supporting the family until he was twenty years of age. He had learned the rudiments of Latin, Greek and some English grammar from a traveling schoolmaster and now (in 1816) entered the sophomore class of Brown University. In spite of the fact that he had consumptive symptoms and was compelled to support himself while at college, he graduated in 1819, and for the next two years taught Latin and Greek in the University. In 1821 he entered a law school and in 1823 was admitted to the bar. In 1823 he was elected to the State Legislature and in 1833 to the State Senate of which he became president in 1836 and again in 1837. In 1837 the Massachusetts Board of Education was organized and he was elected secretary. For this cause he gave up his profession and worked on an average of fifteen hours a day for eleven years. On the death of John Quincy Adams, 1848, he was sent to Congress to take his place and was re-elected in 1850. In 1852 he failed to get the governorship of Massachusetts, but was chosen president of Antioch College, which had just been established at Yellow Springs, Ohio, where he remained until his death, Aug. 2, 1859.

Mann's chief work in education was the reform of the common and normal school system. He brought about these reforms in three ways, by a series of teachers' conferences; through his periodical, *The Common-School Journal;* and most of all through his annual *Report,* which the American critics have called "a classic on the subject." Some

of his works are *A Few Thoughts for a Young Man,* 1850; *Slavery, Letters and Speeches,* 1851; and *Powers and Duties of Women,* 1853.

LESSONS FROM EUROPE

On reviewing a period of six weeks, the greater part of which I spent in visiting schools in the north and middle of Prussia and in Saxony (excepting, of course, the time occupied in going from place to place), entering the schools to hear the first recitation in the morning, and remaining until the last was completed at night, I call to mind three things about which I cannot be mistaken. In some of my opinions and inferences, I may have erred; but, of the following facts, there can be no doubt:—

1. During all this time I never saw a teacher hearing a lesson of any kind (excepting a reading or spelling lesson) with a book in his hand.

2. I never saw a teacher sitting while hearing a recitation.

3. Though I saw hundreds of schools, and thousands—I think I may say, within bounds, tens of thousands—of pupils, I never saw one child undergoing punishment, or arraigned for misconduct. I never saw one child in tears from having been punished, or from fear of being punished.

During the above period, I witnessed exercises in geography, ancient and modern; in the German language, from the explanation of the simplest words up to *belles-lettres* disquisitions, with rules for speaking and writing; in arithmetic, algebra, geometry, surveying, and trigonometry; in book-keeping; in civil history, ancient and modern; in natural philosophy; in botany and zoölogy; in mineralogy, where there were hundreds of specimens; in the endless variety of the exercises in thinking; knowledge of Nature, of the world, and of society; in Bible history and in Bible knowledge: and, as I before said, in no one of these cases did I see a teacher with a book in his hand. His book—his books—his library, was in his head. Promptly, without pause, without hesitation, from the rich resources of his own mind, he brought forth whatever the occasion demanded. I remember calling one morning at a country school in Saxony, where everything about the premises, and the appearance both of teacher and children, indicated very narrow pecuniary circumstances. As I entered, the teacher was just ready to com-

mence a lesson or lecture on French history. He gave not only the events of a particular period in the history of France, but mentioned, as he proceeded, all the contemporary sovereigns of neighboring nations. The ordinary time for a lesson, here as elsewhere, was an hour. This was somewhat longer; for, towards the close, the teacher entered upon a train of thought from which it was difficult to break off, and rose to a strain of eloquence which it was delightful to hear. The scholars were all absorbed in attention. They had paper, pen, and ink before them, and took brief notes of what was said. When the lesson touched upon contemporary events in other nations,—which, as I suppose, had been the subject of previous lessons,—the pupils were questioned concerning them. A small text-book of history was used by the pupils, which they studied at home.

I ought to say, further, that I generally visited schools without guide, or letter of introduction; presenting myself at the door, and asking the favor of admission. Though I had a general order from the minister of public instruction, commanding all schools, gymnasia, and universities in the kingdom to be opened for my inspection, yet I seldom exhibited it, or spoke of it,—at least not until I was about departing. I preferred to enter as a private individual and uncommended visitor.

I have said that I saw no teacher sitting in his school: aged or young, all stood. Nor did they stand apart and aloof in sullen dignity. They mingled with their pupils, passing rapidly from one side of the class to the other, animating, encouraging, sympathizing, breathing life into less active natures, assuring the timid, distributing encouragement and endearment to all. The looks of the Prussian teacher often have the expression and vivacity of an actor in a play. He gesticulates like an orator. His body assumes all the attitudes, and his face puts on all the variety of expression, which a public speaker would do if haranguing a large assembly on a topic vital to their interests.

It may seem singular, and perhaps to some almost ludicrous, that a teacher, in expounding the first rudiments of hand-writing, in teaching the difference between a hair-stroke and a ground-stroke, or how an *l* may be turned into a *b*, or a *u* into a *w*, should be able to work himself up into an oratorical fervor; should attitudinize, and gesticulate, and stride from one end of the class to the other, and appear in every way to be as intensely engaged as an advocate when arguing an important cause to a jury. But, strange as it may seem, it is nevertheless true; and, before five minutes of such a lesson had elapsed, I have seen the

children wrought up to an excitement proportionally intense, hanging upon the teacher's lips, catching every word he says, and evincing great elation or depression of spirits as they had or had not succeeded in following his instructions. So I have seen the same rhetorical vehemence on the part of the teacher, and the same interest and animation on the part of the pupils, during a lesson on the original sounds of the letters; that is, the difference between the long and short sound of a vowel, or the different ways of opening the mouth in sounding the consonants *b* and *p*. This zeal of the teacher enkindles the scholars. He charges them with his own electricity to the point of explosion. Such a teacher has no idle, mischievous, whispering children around him, nor any occasion for the rod. He does not make desolation of all the active and playful impulses of childhod, and call it peace; nor, to secure stillness among his scholars, does he find it necessary to ride them with the nightmare of fear. I rarely saw a teacher put questions with his lips alone. He seems so much interested in his subject (though he might have been teaching the same lesson for the hundredth or five hundredth time), that his whole body is in motion,—eyes, arms, limbs, all contributing to the impression he desires to make; and, at the end of an hour, both he and his pupils come from the work all glowing with excitement.

Suppose a lawyer in one of our courts were to plead an important cause before a jury, but instead of standing and extemporizing, and showing by his gestures, and by the energy and ardor of his whole manner, that he felt an interest in his theme, instead of rising with his subject, and corruscating with flashes of genius and wit, he should plant himself lazily down in a chair, read from some old book which scarcely a member of the panel could fully understand, and, after droning away for an hour, should leave them, without having distinctly impressed their minds with one fact, or led them to form one logical conclusion; would it be any wonder if he left half of them joking with each other, or asleep? would it be any wonder—provided he were followed on the other side by an advocate of brilliant parts, of elegant diction, and attractive manner, by one who should pour sunshine into the darkest recesses of the case—if he lost not only his own reputation, but the cause of his client also?

These incitements and endearments of the teacher, this personal ubiquity, as it were, among all the pupils in the class, prevailed much more as the pupils were younger. Before the older classes, the teacher's manner became calm and didactic. The habit of attention being once

formed, nothing was left for subsequent years or teachers but the easy task of maintaining it. Was there ever such a comment as this on the practice of hiring cheap teachers because the school is young, or incompetent ones because it is backward?

In Prussia and in Saxony, as well as in Scotland, the power of commanding and retaining the attention of a class is held to be a *sine qua non* in a teacher's qualifications. If he has not talent, skill, vivacity, or resources of anecdote and wit, sufficient to arouse and retain the attention of his pupils during the accustomed period of recitation, he is deemed to have mistaken his calling, and receives a significant hint to change his vocation.

Take a group of little children to a toy-shop, and witness their outbursting eagerness and delight. They need no stimulus of badges or prizes to arrest or sustain their attention; they need no quickening of their faculties by rod or ferrule. To the exclusion of food and sleep, they will push their inquiries, until shape, color, quality, use, substance, both external and internal, of the objects, are exhausted; and each child will want the showman wholly to himself. But in all the boundless variety and beauty of Nature's work; in that profusion and prodigality of charms with which the Creator has adorned and enriched every part of His creation; in the delights of affection; in the ecstatic joys of benevolence; in the absorbing interest which an unsophisticated conscience instinctively takes in all questions of right and wrong,—in all these, is there not as much to challenge and command the attention of a little child as in the curiosities of a toy-shop? When as much of human art and ingenuity has been expended upon teaching as upon toys, there will be less difference between the cases.

The third circumstance I mentioned above was the beautiful relation of harmony and affection which subsisted between teacher and pupils. I cannot say that the extraordinary fact I have mentioned was not the result of chance or accident. Of the probability of that, others must judge. I can only say that, during all the time mentioned, I never saw a blow struck, I never heard a sharp rebuke given, I never saw a child in tears, nor arraigned at the teacher's bar for any alleged misconduct. On the contrary, the relation seemed to be one of duty first, and then affection, on the part of the teacher; of affection first, and then duty, on the part of the scholar. The teacher's manner was better than parental; for it had a parent's tenderness and vigilance without the foolish dotings or indulgences to which parental affection is prone.

I heard no child ridiculed, sneered at, or scolded, for making a mistake. On the contrary, whenever a mistake was made, or there was a want of promptness in giving a reply, the expression of the teacher was that of grief and disappointment, as though there had been a failure, not merely to answer the question of a master, but to comply with the expectations of a friend. No child was disconcerted, disabled, or bereft of his senses, through fear. Nay, generally, at the ends of the answers, the teacher's practice is to encourage him with the exclamation, "good," "right," "wholly right," &c., or to check him with his slowly and painfully articulated "no;" and this is done with a tone of voice that marks every degree of plus and minus in the scale of approbation or regret. When a difficult question has been put to a young child which tasks all his energies, the teacher approaches him with a mingled look of concern and encouragement; he stands before him, the light and shade of hope and fear alternately crossing his countenance; he lifts his arms and turns his body, as a bowler who has given a wrong direction to his bowl will writhe his person to bring the ball back upon its track; and finally, if the little wrestler with difficulty triumphs, the teacher felicitates him upon his success, perhaps seizes and shakes him by the hand in token of congratulation; and when the difficulty has been really formidable, and the effort triumphant, I have seen the teacher catch up the child in his arms and embrace him, as though he were not able to contain his joy. At another time, I have seen a teacher actually clap his hands with delight at a bright reply; and all this has been done so naturally and so unaffectedly as to excite no other feeling in the residue of the children than a desire, by the same means, to win the same caresses. What person worthy of being called by the name, or of sustaining the sacred relation of a parent, would not give any thing, bear any thing, sacrifice any thing, to have his children, during eight or ten years of the period of their childhood, surrounded by circumstances, and breathed upon by sweet and humanizing influences, like these?

I mean no disparagement of our own teachers by the remark I am about to make. As a general fact, these teachers are as good as public opinion has demanded; as good as the public sentiment has been disposed to appreciate; as good as public liberality has been ready to reward; as good as the preliminary measures taken to qualify them would authorize us to expect. But it was impossible to put down the questionings of my own mind,—whether a visitor could spend six weeks in our own schools without ever hearing an angry word spoken, or seeing a blow struck, or witnessing the flow of tears?

In the Prussian schools, I observed the fair operation and full result of two practices which I have dwelt upon with great repetition and urgency at home. One is, when hearing a class recite, always to ask the question before naming the scholar who is to give the answer. The question being first asked, all the children are alert; for each one knows that he is liable to be called upon for the reply. On the contrary, if the scholar who is expected to answer is first named, and especially if the scholars are taken in succession, according to local position,—that is, in the order of their seats or stations,—then the attention of all the rest has a reprieve until their turns shall come. In practice, this designation of the answerer before the question is propounded operates as a temporary leave of absence or furlough to all the other members of the class.

The other point referred to is that of adjusting the ease or difficulty of the questions to the capacity of the pupil. A child should never have any excuse or occasion for making a mistake; nay, at first he should be most carefully guarded from the fact, and especially from the consciousness, of making a mistake. The questions should be ever so childishly simple, rather than that the answers should be erroneous. No expense of time can be too great, if it secures the habit and the desire of accuracy. Hence a false answer should be an event of the rarest occurrence,—one to be deprecated, to be looked upon with surprise and regret, and almost as an offence. Few things can have a worse effect upon a child's character than to set down a row of black marks against him at the end of every lesson.

The value of this practice of adjusting questions to the capacities and previous attainments of the pupils cannot be over-estimated. The opposite course necessitates mistakes, habituates and hardens the pupils to blundering and uncertainty, disparages the value of correctness in their eyes, and—what is a consequence as much to be lamented as any—gives plausibility to the argument in favor of emulation as a means of bringing children back to the habit of accuracy from which they have been driven. Would the trainer of horses deserve any compensation, or have any custom, if the first draughts which he should impose upon the young animals were beyond their ability to move?

The first of the above-named practices can be adopted by every teacher immediately, and whatever his degree of competency in other respects may be. The last improvement can only be fully effected when the teacher can dispense with all text-books, and can teach and question

from a full mind only. The case is hopeless where a conspiracy against the spread of knowledge has been entered into between an author who compiles, and a teacher who uses, a text-book in which the questions to be put are all prepared and printed.

In former reports, I have dwelt at length upon the expediency of employing female teachers to a greater extent in our schools. Some of the arguments in favor of this change have been, the greater intensity of the parental instinct in the female sex, their natural love of the society of children, and the superior gentleness and forbearance of their dispositions,—all of which lead them to mildness rather than severity, to the use of hope rather than of fear as a motive of action, and to the various arts of encouragement, rather than to annoyances and compulsions, in their management of the young. These views have been responded to and approved by almost all the school-committee men in the State; and, within the last few years, the practice of the different districts has been rapidly conforming to this theory. I must now say that those views are calculated only for particular meridians. In those parts of Germany which I have seen, they would not be understood. No necessity for them could be perceived. There, almost all teachers, for the youngest children as well as for the oldest, are men. Two or three times, I saw a female teacher in a private school; but none in a public, unless for teaching knitting, needle-work, &c. Yet, in these male teachers, there was a union of gentleness and firmness that left little to be desired.

Still, into almost every German school into which I entered, I inquired whether corporal punishment were allowed or used, and I was uniformly answered in the affirmative. But it was further said, that although all teachers had liberty to use it, yet cases of its occurrence were very rare, and these cases were confined almost wholly to young scholars. Until the teacher had time to establish the relation of affection between himself and the new-comer into his school; until he had time to create that attachment which children always feel towards any one who, day after day, supplies them with novel and pleasing ideas, —it was occasionally necessary to restrain and punish them. But, after a short time, a love of the teacher and a love of knowledge become a substitute—how admirable a one!—for punishment. When I asked my common question of Dr. Vogel of Leipsic, he answered, that it was still used in the schools of which he had the superintendence. "But," added he, "thank God, it is used less and less; and, when we teachers become fully competent to our work, it will cease altogether."

To the above I may add, that I found all the teachers, whom I visited, alive to the subject of improvement. They had libraries of the standard works on education,—works of which there are such great numbers in the German language. Every new book of any promise was eagerly sought after; and I uniformly found the educational periodicals of the day upon the tables of the teachers. From the editor of one of these periodicals, I learned that more than thirty of this description are printed in Germany, and that the obscurest teacher in the obscurest village is usually a subscriber to one or more.

A feeling of deep humiliation overcame me as I contrasted this state of things with that in my own country, where, of all the numerous educational periodicals which have been undertaken within the last twenty years, only two, of any length of standing, still survive. All the others have failed through the indifference of teachers and the apathy of the public. One of the remaining two—that conducted by F. Dwight, Esq., of Albany, N. Y.,—would probably have failed ere this, had not the legislature of the State generously come to its rescue, by subscribing for twelve thousand copies,—one to be sent to each district school in that great State. The other paper, as it is well known, has never reimbursed to its editor his actual expenses in conducting it.

The extensive range and high grade of instruction which so many of the German youth are enjoying, and these noble qualifications on the part of their instructors, are the natural and legitimate result of their seminaries for teachers. Without the latter, the former never could have been, any more than any effect without its cause. Although "the first regular seminary for teachers" (see Dr. Bache's report, page 222) "was established at Stettin in Pomerania in 1735," yet it was not until within the last quarter of a century, and especially since the general pacification of Europe, that the system has made such rapid advances towards perfection. And so powerfully has this system commended itself to all enlightened men, that not only have these seminaries for teachers been constantly increasing in Prussia, in Saxony, and in the States of the west and south-west of Germany, but most of the enlightened governments of Europe have followed the example. Out of Prussia, the plan was first adopted in Holland. The celebrated normal school of Mr. Prinsen was established at Haarlem, in 1816; and it is now acknowledged by all, that common-school education has been reformed and immeasurably advanced throughout the whole of that enlightened country by the influence of this school.

When that great governmental measure for the establishment of common schools throughout France was adopted in 1833, one of its main features was the creation of normal schools. At these institutions, young men are not only educated, but gratuitously maintained; they enjoy certain civil privileges, are exempted from military service, and, if they acquit themselves worthily, they are certain of an appointment as a school-teacher at the end of their course.

It is a fact most interesting in itself, and worthy to be cited as one of the proofs of the advancement (however slow) of the race, that the normal school now in successful operation at Versailles occupies the very site—some of its buildings are the very buildings, and its beautiful grounds the very grounds—which were the dog-kennels of Louis XIV. and his royal successors.

Scotland, so long and so justly celebrated among the countries of Europe for the superior education of its people, was not slow to discover the advantages of schools for the preparation of teachers. It has now one such school at Edinburgh, and one at Glasgow, besides the Madras College at St. Andrew's, which exercises the double function of giving a classical education, and of preparing teachers for schools.

Under the enlightened administration of the National Board of Education of Ireland, a normal school has been established at Dublin, and placed upon the most liberal basis. Excellent buildings with large and beautiful yards and play-grounds are provided for it in the very heart of the city. Here hundreds of the poor children are in constant attendance, to whom instruction is given, in part by professional teachers, and in part by the pupils of the normal school. The normal pupils reside at a place called Glasnevin, a little way out of the city. Here they have a farm, which is conducted by a scientific agriculturist. When not engaged at the school in the city, the pupils are occupied on the farm. At this normal school, none but actual teachers are received. They leave their own schools, and come from all parts of Ireland to receive instruction here. Their whole maintenance—tuition, board, lodging—is gratuitous; and a certain sum is secured to them annually on their return to their schools. More than a thousand teachers have already availed themselves of the benefits of this noble charity.

Though the government of England has declined to follow the example of all the enlightened nations of Europe, yet private individuals and societies are striving to remedy, to some extent, the consequences of this neglect. A normal school established under the auspices of that enlightened educationist, Mr. Kay Shuttleworth, is now in successful

operation at Battersea; and the Church party have recently purchased and fitted up, at an expenes of a hundred thousand dollars, a normal school at Chelsea, near London.

After the revolution of 1830 which separated Belgium from Holland, the former country neglected its schools; and, since that period, it seems to be acknowledged on all hands that the education of the Belgian people has been rapidly retrograding. But, by virtue of a recent law (Sept. 23, 1842), an entire school system is now organizing for that country. Under the new order of things, there are to be two normal schools,—one at Lierre in the Province of Antwerp, the other at Nivelles in the Province of Brabant.

Even at St. Petersburg, in Russia, says Professor Stowe, "a model school for the education of teachers of every grade, and for all parts of the empire," has been established. Thus it appears that almost every member of the great European family of nations, which possesses any claims to be called enlightened or civilized, has looked with favor upon what may be considered one of the greatest of all modern instrumentalities for the improvement of the race; and has either founded this class of institutions by the direct authority and endowment of the government itself, or has allowed and encouraged the same thing to be done by the liberal and philanthropic portion of its people. One empire alone has signalized its name by an opposite course. That empire is Austria. Although the Austrian government maintains what it calls a system of schools, yet they are schools which set metes and bounds, on all sides, to the development of the human faculties; although it prepares a few teachers, yet it is the office of these teachers to lop and prune the common mind, and not to develop it; and when, during the very year previous to my visit, in a part of that empire bordering upon the kingdom of Saxony,—across whose frontier a litttle of the light and genial warmth of education had been reflected,—a few of the more enlightened subjects of that arbitrary power applied to it for liberty to establish a normal school within their own province, and offered to supply, gratuitously, the money requisite for the purpose, both the application and the offer were rejected with indignity. Austria, impenetrable Austria, over which the black horizon of despotism shuts down like a cover, excluding, as far as possible, all light, intelligence, and knowledge,—Austria, true to the base and cowardly instincts of ignorance and bigotry, disallows the establishment of a free normal school for the improvement of its people, and spurns the proffered munificence of the noble benefactors who would endow it!

INVENTIONS

FROM THE LAST of the Eighteenth Century to the present time may well be spoken of as an era of invention. Space would forbid us describing in detail these many innovations, but it will serve to give an idea of the changes in society which they imply if we note the times of the discovery of the most important. Most of them are now so common as to make any detailed account tiresome, but it will be of value to note, where possible, the principle the invention embodies.

THE SPINNING JENNY was invented by James Hargreaves in 1767. He had tried in vain to spin several threads at once, when one day his child overturned the spinning-wheel, leaving the spindle revolving vertically. He constructed a machine on this principle. The neighbors broke in and demolished it. His patent was set aside by the courts and he died a poor man in 1778.

THE STEAM ENGINE was first made practical by Watt in 1768. His description of its discovery is given in Volume VI.

STEAM HEATING was thought out by Watts in 1784, but it was not applied until comparatively recently.

THE WEAVING-LOOM, by Edmund Cartwright (1743-1823), in 1785. Cartwright was a country clergyman of poetical tastes, the author of "Armine and Elvira," and "The Prince of Peace." He was the first to apply machinery to weaving. His first power loom, in 1785, was a rude one, but was later much improved on. The first mill on his plan was burned by incendiaries in 1791, but in the next twenty years weaving by machinery became common. In 1809 Parliament voted him a reward of £10,000.

THE LIFE-BOAT was constructed successfully by Lionel Lukin in 1785.

BALLOONS were first used by Montgolfier in 1783. Montgolfier used heated air; a few weeks later Messrs. Charles and Roberts improved on this idea by using hydrogen.

THE COTTON GIN was invented by Eli Whitney in 1793. Whitney was born in Westboro, Mass., Dec. 8, 1765. He graduated at Yale in 1792 and went to Georgia, where he studied law while living at the home of the widow of Gen. Nathanael Greene. The greatest difficulty of the time in the cotton industry was to separate the cotton from the seeds, which had to be done by hand. Stimulated by Mrs. Greene, Whitney began the construction of a separator—the cotton gin—on her estate. Reports of his success caused his workshop to be broken into and his idea stolen before he could get a patent. He formed a partnership in 1793 and went to Connecticut to begin the manufacture of cotton gins. South Carolina voted him $50,000, but all profits were eaten up by legislation. In 1798 he began the manufacture of firearms on a government contract, and made a large fortune in his new business. He was one of the first to apply division of labor in manufacture. He died Jan. 8, 1825. The working of the roller gin for long cotton is described by Basil Hall in Volume IX. The principle of the gin used for the short cotton is to draw in the cotton by means of revolving saws projecting between wires so close together that the seeds can not pass between them.

GAS LIGHTING was made practical by Wm. Murdoch in 1792. He was born in Ayrshire, Scotland, Aug. 25, 1754. While in Cornwall superintending the fitting of engines for Watt and Boulton, he discovered that when coal is heated to a red heat in a close vessel it gives off a gas which, after the water and tar are condensed from it, is suitable for lighting purposes. He lighted his cottage and offices with this gas in 1792, and the Boulton and Watt factory in 1802. Westminster bridge in London was so lighted Dec. 31, 1813, and Guildhall in 1815. The first successful manufacture in the United States was in New York in 1827.

LITHOGRAPHY was first invented by Aloys Senefelder, a Bohemian actor who attempted literature and finally engaged in the printing business. This led to his inventing lithography in 1796, but it was not until 1806, when he received the support of the Bavarian Government, that he was able to perfect his invention. The materials used are a

slab of closely grained limestone about three or four inches thick; the crayon is of a greasy composition, composed principally of wax, soap, tallow, shellac, turpentine, and lampblack; the ink used for drawing with a pen on the stone is composed of the same ingredients with a trifle more grease and dissolved with water. After the stone has been carefully polished the drawing is made on it the same as on paper, only reversed. When the drawing is finished it is bathed with a solution of nitric acid and gum arabic, to keep the grease of the crayon or ink from spreading and rendering those parts of the stone having no drawing on them more porous and capable of absorbing moisture. When the acid and gum arabic has dried, the stone is washed with water, then the drawing is washed off with turpentine, leaving only the grease of the drawing on the stone. The stone is now moistened and when the ink-roller goes over it only the part kept dry by the grease, that is the drawing, takes ink and prints. The whole principle of lithography rests on the antagonism of grease to water. In latter years photography has been more or less applied to lithography.

Percussion Arms were first contrived by the Rev. Mr. Foryyth of Aberdeenshire in 1807. Caps were not used with them at first, but became common in the twenties and percussion arms were adopted for the army in 1840. In the breech-loading gun which metallic-cased cartridges made practical soon afterwards—though it had been experimented on for centuries—the cap is constructed as part of the cartridge.

The Steamboat was first made a success by Fulton. Robert Fulton was born at Little Brittan, Pennsylvania, in 1765. His father died when he was three years old. When he was seventeen he went to Philadelphia and practiced the art of miniature-painting there and in New York. In four years' time he had saved enough to buy a farm for his mother's support and in 1786 he went to London and became a pupil of West. While there he made the acquainance of the Duke of Bridgewater, father of the British canal system; Lord Stanhope, an enthusiastic mechanician; and with Watt, the inventor of the steam-engine; and partly through their influence his attention was turned strongly to mechanical invention, his true field of labor. Then follow his machines for marble-sawing, rope-making, flax-spinning, and removing earth from excavations. His *Treatise on the Improvement of Canal Navigation* (1796) and a series of essays on canals were followed by a British patent for canal improvements, consisting chiefly in the substitution of inclined planes for locks. He resided in Paris 1797-

1806, and then brought forward a sub-marine torpedo-boat for marine defense, which was rejected by the French and British Governments in 1805, and the United States Government in 1810. In 1793 he had conceived the design of propelling vessels by steam, but did not find suitable opportunity for putting his views into practice. It was thought that the paddle wheel would lose in lifting water at the end of the stroke all the momentum it would give the boat at the beginning, but Fulton thought otherwise. While still in Paris (1806) he first succeeded in his design. Aided by Chancellor Livingston, then United States Minister in France, he purchased a Boulton and Watt engine and shipped it to New York, where, after careful study of the defects and merits of previous attempts in the same direction he built and launched (in 1807) the Clermont, his first successful steamboat, which attained the speed of only five miles an hour. He took out his first patent in 1809, but his rights were disputed and a compromise was effected. Throughout life Fulton was involved in lawsuits with parties infringing upon his claims. In 1814 he constructed the first United States war steamer, and was engaged upon an improvement of his sub-marine torpedo when he died, Feb. 24, 1815. There is no need enlarging on the influence of his chief invention, the steamboat. There had been many previous attempts to apply steam to navigation by use of a paddle wheel, goose-foot, screw propeller, and the like, but Fulton was the first to persevere until he succeeded.

The Safety Lamp was first constructed by Sir Humphry Davy in 1815 and about the same time by George Stephenson. The principle discovered was that metallic gauze acts the same as a series of square tubes and does not allow the flame to pass it to be communicated to the inflammable fire-damp of a mine. If a lighted lamp surrounded by a gauze netting is exposed where there is fire-damp a pale flame fills the whole inside of the netting and gives warning of the danger, but does not explode the fire-damp unless the netting should be broken.

The Locomotive Steam-Engine was first satisfactorily constructed by George Stephenson. Stephenson was born at Wylam, a village in Northumberland, England, June 9, 1781, son of Robert Stephenson, fireman of a colliery engine. His first employment was herding cows at 2d. per day; from this he was promoted to hoeing turnips at 4d.; he next drove a gin horse at the colliery, and in his fourteenth year he became assistant to his father in firing the engine at a shilling a day, and at fifteen we find him rejoicing at 12 shillings

a week. At seventeen he was appointed engine man or plug man. Stimulated by a desire for fuller information regarding the wonderful inventions of Boulton and Watt, he attended a night school where he learned to read. He occupied his leisure hours taking his machine apart and putting it together again, thus gaining a thorough knowledge of it. In 1810 accident gave him an opportunity of putting in motion a steam-engine that needed repairs, and in 1812 he was made engine-wright at Killingworth Colliery at a salary of £100 a year.

The early life of Stephenson presents a record, whose interest cannot be surpassed, of a contest between determined purpose, industry, and sagacity on the one hand, against poverty on the other. Inch by inch we find the inward forces gaining ground upon the outward. The problem of constructing a locomotive steam-engine was then occupying many minds, and he was in 1814 the first to construct one which proved satisfactory. He originated the steam-blast, which was introduced into his second locomotive, built in 1815. In the same year he invented a miner's safety lamp that is still in use in some English collieries. Stephenson now turned his attention to improving railways as well as engines. His first railway, opened in 1822, was eight miles long, and so successful that the next year he was appointed engineer of the railway authorized to be constructed between Stockton and Darlington, and in 1825, at a salary of £1,000 a year, of the Liverpool and Manchester line, which was begun in 1826. During this time he had set up an establishment at Newcastle-upon-Tyne for the manufacture of locomotives, and on Oct. 6, 1829, his engine, named Rocket, attained an average speed of 14 miles an hour and was driven for a short distance at the rate of 29 miles. For the next fifteen years he was actively engaged as a railway engineer and contractor in England and on the Continent, still carrying on his great locomotvie factory at Newcastle, and also engaging in coal-mining and lime-works. During the three years ending 1837, he was principal engineer on the North Midland, York and North Midland, Manchester and Leeds, Birmingham and Derby, and Sheffield and Rotherham railways. In 1836 alone, 214 miles of railway were put under his direction, involving a capital of five millions. In 1845 he visited Belgium and Spain for professional purposes. On his way home he was seized with pleurisy from which attack he does not seem to have ever thoroughly recovered. He retained during all his life, in speech and manners, much of the rustic simplicity belonging to his early life, and declined the honor of knighthood. By common consent he has

received the title of the father of railways. He occupied his declining years as a country gentleman and died at Tapton House, his country-seat, Aug. 12, 1848.

Friction Matches were first made practical by John Walker in 1827. Before this time flint and steel were most depended upon, though a sulphur match which was ignited by being dipped in a bottle containing phosphorus was some used. Walker made a match, the wooden splint of which was tipped with sulphur covered with a mixture of sulphide of antimony, chlorate of potash and gum. He sold a box of eighty-four matches and a piece of sandpaper for a shilling.

Red Phosphorus was discovered by von Schroeter of Vienna in 1845 and safety matches made from it by Lundström of Sweden in 1855.

Photography was first taken up by Wedgewood and Davy. In 1802 Wedgewood, using the fact that sunlight turns nitrate of silver black, impregnated paper with this compound and managed to take a picture of a drawing on the paper in black and white, but Wedgewood and Davy working together could find no way of preventing the whole paper from turning black when exposed to the light.

Niepce in 1814 found that asphalt is made insoluble by sunlight. He exposed a film under a drawing, then dissolved the shadows with a mixture of oil of lavender and white petroleum. Niepce died in 1833, but Daguerre continued the work.

In 1839 Daguerre plated copper with polished silver, then covered it with a film of silver iodide by exposing it to the fumes of iodine. After being left in the light for about thirty minutes this plate was put over a dish of heated mercury, the vapor of which condensed in white on the parts illuminated, thus giving a picture in white and silver.

Many of the photographic processes since discovered depend on this action of sunlight (the lavender end) on the salts of silver, which causes the halogen to be lost. If the salts be alone the loss is slow, but if they be mixed with something that easily absorbs the halogen the action is rapid. Such substances are silver nitrate, gelatin, tannin, etc.

In the carbon process, the gelatin is mixed with colored bichromate of potassium or ammonium, instead of silver salts. This the light makes insoluble in water. The other parts are washed off.

In the platinotype the paper is coated with ferric and platinum salts. Light reduces the ferric to a ferrous salt and when this is dissolved by the developer (oxalate of potassium) it reduces the platinum salt, giving an image in black.

GUNCOTTON was approached by Braconnet in 1832. He found that by dissolving starch in nitric acid and adding water a white explosive of great strength was obtained. It was, however, too liable to explode and its use was not practical until Baron von Lenk of Austria in 1853 and Mr. Abel of England in 1863 greatly improved it by using cotton as an absorbent. Abel's guncotton is prepared from cotton waste treated with a mixture of nitric and sulphuric acids.

Nitroglycerin, consisting of nitric and sulphuric acid introduced into glycerin, was made by Alfred Nobel of Sweden in 1864. He also invented dynamite by mixing this with an absorbent earth (1866).

THE TELEGRAPH was thought of at about the same time by many persons, notably Baron Schilling, W. F. Cooke, Wheatstone and Morse, but the most practical system has proved to be that of Morse. All of these but Morse constructed a system depending on the principle that an electric current will deflect a magnetic needle. Morse used the induction principle discovered by Joseph Henry.

Samuel Finley Breese Morse was born in Charlestown, Mass., Apr. 27, 1791. He graduated from Yale in 1810 and went to England to study art under Allston and West. In 1811 his "Dying Hercules" was accepted at the Academy and his sculpture of the same subject received a prize the same year. In 1814 he returned to America and was forced to paint portraits at fifteen dollars apiece for a living. He thought out his great invention while returning from a second trip to Europe in 1832.

In 1835 he constructed an experimental line. In 1837 he gave an exhibition in New York and applied for a patent. He asked Congress for help, but the session passed without his receiving it. He met as little encouragement in England and France and was reduced to actual hunger. He renewed his appeal to Congress year after year and finally on the last night of the session in March, 1843, after Morse had left disheartened, the bill voting him $30,000 for experimental purposes was granted. The wires were at first enclosed in lead pipe and buried, but this proved both costly and unsuccessful. Then insulated wires on poles were tried and found to work. The first message was sent May 24, 1844. The principle of Morse's telegraph was the fact, discovered by Henry and Faraday, that a current sent through a wire (the helix) wound about an iron armature makes the armature a magnet. This attracts one end of an iron lever suspended above it. The lever remains down only as long as the current passes. The pressing of the key at the other end makes the connection and sends a current along the wire.

All this was Morse's contrivance, but his special addition was the "relay." By this arrangement the current from a distance does not act directly upon the local armature, but by practically the same method sets in action a local battery which in turn acts on the armature and lever. This adds strength to the current at every station and makes long distance telegraphing merely a question of relays. Morse died April 2, 1872.

THE REAPER is the product principally of Bell, Hussey, and McCormick. Bell of Scotland invented a reaper on the scissors principle in 1826 which was a great improvement on the scythe. In 1833 Obed Hussey invented a reaper that used the reciprocating indented-edge knife now a part of all machines. McCormick's reaper was patented the next year, but had been successfully tried in 1831. The influence of the reaper and of its further developed forms—the binder, etc.,—has been enormous.

THE SEWING MACHINE is another invention that has had a wonderful influence on ordinary life. It was first made by Elias Howe in 1841. Howe was a poor mechanic and did his work on his machine at night. His first patent was in 1841, but he could not get people to see the use of his crude mechanism. He went to England and patented it, but was compelled to sell it out for £250 and a royalty of £3 on each machine. On his return to the United States he successfully fought an infringement on his patent. The principle of his invention was the lock stitch made by the shuttle underneath passing between the needle above and its thread at every stitch. Howe's original machine was not well enough made to be practical, but his patents made Wilson and others using this stitch pay him royalty.

ANAESTHETICS for surgical purposes came into use the middle of the nineteenth century. The agonies undergone during operations before that time can now scarcely be imagined. Balzac describes something of them in "Joseph Balsamo." In 1846 Dr. W. T. G. Morton of Boston first used ether in an operation. Even before this he had used it successfully in dentistry. In November, 1847, Sir J. Y. Simpson first administered chloroform to a patient. Its use had already been tried upon lower animals by Flourens. Ether is supposed to act by causing temporary carbonic-dioxide poisoning, and chloroform by driving the blood from the brain.

THE DYNAMO and ELECTRIC MOTOR have been developed from the facts discovered by Henry and Faraday, that a magnet passed in or

out of a hollow ball of wire (a helix) generates a current in the wire, that a magnet revolved across a wire causes a current in the wire, that *vice versa* a current running along a wire will turn an electric needle or magnet, and that a current run round a bar of iron makes a magnet of it.

The first machines to generate electricity by induction were made by Saxon in the United States and Pixii in France (1832). A permanent horseshoe steel magnet was revolved with its ends facing two helixes (an armature) consisting of many coils of insulated wire. Their strength was of course limited by the power of the horseshoe magnet and they were not very useful for mechanical purposes for this reason, besides which the current was of course an alternating one, changing directions with each half-turn of the magnet. To remedy this last defect, the commutator was invented. This consisted at first of two connections with the armature, one of which carried away all the positive current as it was generated and passing round the armature, the other all the negative current. Merely being connected at opposite sides of the armature would do this.

The next step was made by Soren Hjorth of Copenhagen in 1855, when he wound coils of wire round the magnet and led the current back through these, thus vastly increasing the strength of the magnet. Siemens and Gramme both did much to perfect such machines about 1870.

During all this time the development of the electric motor was slowly advancing, retarded by the fact that the electricity, which it was desired to turn into mechanical energy, was generated by the voltaic battery. Such a battery was satisfactory for the telegraph and would do for experimental purposes, but could not furnish power enough for commercial uses. Henry invented an electro-motor run by a battery in 1828. The great advance was made by accident at the Vienna exhibition in 1873, when a workman on the Gramme dynamos discovered that if two were joined either would act as a dynamo or as a motor; that is, that they were in principle interchangeable, merely the reverse of each other. Since then the development has been rapid. In 1879 Dr. Werner Siemens constructed a crude but successful electric railway in Berlin. The first in America was built at Baltimore in 1885.

Bessemer Steel is the invention of Henry Bessemer of England. He was born in Hertfordshire, Jan. 13, 1813, the youngest son of a French refugee. He began to work at the age of eighteen as a modeler and designer in London, and soon devised an improved method of

stamping deeds which the English Stamp Office adopted without compensation. He later invented a method of making bronze powder, which is still used commercially. An invention concerning projectiles brought him into touch with the steel manufacture. The old method of making steel was to melt wrought iron together with carbon, then heat it red hot, forge to the form desired, and harden by quenching in water. The introduction by J. Beaumont Neilson in 1828 of the hot air blast in furnaces for making pig iron tripled the product and vastly reduced the fuel required. Such pig iron must be refined before it can be wrought, welded or rolled. What was now needed was a method of partially purifying this pig iron. If all the impurities are taken out, the product is wrought iron; if part of the carbon is left in, the result is steel. Most pig and cast iron contains silicon besides the carbon. Bessemer in 1855 decided that if air is blown through a mass of molten iron it will unite with the silicon and carbon, keeping up the heat and burning them out. Experiments proved his idea correct. Later ferro manganese or "spiegeleisen," a compound of manganese, carbon and iron, is added to unite with and remove the sulphur and oxide of iron. This was the contribution of R. F. Mushet to the process. The Bessemer process met with a number of failures at first, but after he established works of his own became a great success. It increased the production of steel from 50,000 to 1,600,000 tons in a few years and reduced the cost from $250 to $50 a ton. He died in 1898.

In 1856-66 the Siemens-Martin open hearth process was developed. This is a method of melting the iron by a combination of gas and air burned above it. The product is more expensive but finer than that of the Bessemer process.

The vast increase in the use of iron and steel shows how important these inventions have been. Iron was first used in the construction of buildings in 1857 at the building of the Cooper Institute, and the framework of the modern office building is now entirely of iron. Instead of building an outside of stone thick enough to support the inside, the outside is a mere veneer. The first notable ironclads were the Virginia (Merrimac) and the Monitor in 1862. The development of cannon has kept pace with that of the ironclad.

The First Practical Typewriter was made by C. L. Sholes of Milwaukee in 1868-1871. The first Remington was manufactured in 1878. There are now more than a hundred good machines on the market.

The Telephone was invented in 1876 at the same time by Alex-

ander Graham Bell of Boston and Elisha Gray of Evanston. The principle in brief was this: The waves of the voice undulated a diaphragm; attached to this diaphragm was one end of a small vibrating iron armature; as this was thus vibrating it swung back and forth in front of an electro-magnet; this induced a pulsation in the current flowing continuously through the helix of the electro-magnet; this pulsation was carried to the receiver at the other end, passed through the helix of the electro-magnet there, swung the iron armature, which vibrated the diaphragm and sent sound waves to the ear. Since 1876 there have been many improvements. In 1877 Berliner and Edison modified the plan by producing the undulation in the current through differences of pressure caused by the vibration of the diaphragm between carbon contacts or electrodes. Blake about 1880 added an induction coil whose primary circuit passed through the electrodes, and whose secondary circuit passed over the line.

The Phonograph was invented by Thomas Edison in 1878. Here the vibrations of the sound against a diaphragm caused a needle to trace a path in tinfoil. In reproducing the sounds, the needle followed the path traced in the first place and thus vibrated the diaphragm. In 1886 wax was substituted in place of tinfoil.

The Arc Light was invented, as we have already seen, by Sir Humphry Davy in 1809. His description of it and the use of the heat evolved for electrolysis is given in Volume VIII. The fact that electricity could be supplied only by voltaic batteries made its production too expensive, but the principle was thoroughly understood and as soon as the dynamo made electricity cheap, the arc light was at once put to commercial use.

The Incandescent Light was first made practical by Edison in 1879. Grove in 1840 described the general principle. In 1859 Moses G. Flanner devised a means of subdividing the current so that one light could be lighted without the others, which could not be done with arc lights. In 1877 Wm. E. Sawyer applied for a patent for an electric lighting system. All of these plans, however, were not worked out in sufficient detail to be reliable. Edison used a filament that would not burn out—a great advance; made it fine enough to resist the entrance of a large current, thus leaving the rest of the current to light the other lamps; and made it of material that was practical in cost. The incandescent light requires a continuous current, while an alternating current is used for an arc light system.

More recent developments in electricity, as also in other fields, are taken up in the last volume.